ANGLIA RUSKIN UNIVERSITY

FACULTY OF ARTS, HUMANITIES
AND SOCIAL SCIENCES

THE ROLE OF SEMANTIC TRANSPARENCY IN THE ACQUISITION OF ENGLISH COLLOCATIONS BY SAUDI LEARNERS

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ABSTRACT

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The importance of collocations in L2 language development is well established, but it is also widely acknowledged that collocations are difficult for L2 learners to acquire. Several factors have been investigated that affect their learnability, such as their frequency and the influence of the learner's first language. Nevertheless, the possible effect of the degree of semantic transparency of the collocation being learnt has not yet been sufficiently addressed. Furthermore, the few existing studies have failed to account for the effect of prior familiarity with the constituent words when assessing the learning of collocations. This thesis addresses these gaps by investigating whether the degree of semantic transparency of L2 collocations affects their learnability when prior familiarity is controlled for. Forty-four English verb-noun collocations were selected on the basis of rigorous criteria. Two types of semantic transparency measure were obtained for each collocation. First, human ratings of transparency were elicited from 46 native speakers of American English. Second, distributional semantic measures of transparency were calculated on the basis of co-occurrence frequencies in a corpus. Both the collocations and their constituent words were then explicitly taught to 94 pre-intermediate Saudi students who did not recognize either the collocations or their constituents in a pretest. After five weeks of daily teaching, based on the results of two tests, the extent to which a collocation was learnt was found to be significantly positively correlated with its degree of semantic transparency, whether estimated from human ratings or computational measures. Collocations with lower semantic transparency were less well learnt compared to more transparent ones. However, overall, large learning gains were demonstrated by all the learners in the study, indicating the effectiveness of explicit instruction in promoting the learning of L2 collocations. These findings have important pedagogical implications, since they suggest that collocations can be successfully taught even to low level learners but that most effort needs to go into teaching less transparent combinations. The strong correlation between human ratings of transparency and the cosine similarity measure of the constituent words suggests that this measure can successfully be used to estimate transparency. This is a much less costly and labor-intensive method than obtaining human ratings, which therefore has the potential to be scaled up for application in materials writing and curriculum design more generally.

Key words: L2 collocations; semantic transparency; production; recognition; collocation instruction; distributional measures.

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THE ROLE OF SEMANTIC TRANSPARENCY IN THE ACQUISITION OF ENGLISH COLLOCATIONS BY SAUDI LEARNERS

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Dedication

To my dear mother, my precious sisters and brothers, my caring husband and my lovely children.

1 Introduction

1.1 Introduction

Collocations (e.g., *carry a risk* or *strong coffee*) can be broadly defined as two or more frequently co-occurring words that "convey a message by association" (Choi, 2017, p.406). In the last three decades, they have received substantial attention in Second Language (L2) research (e.g., Bahns and Eldaw 1993; Howarth 1996/1998; Nesselhauf 2005) as well as its pedagogy (e.g., Lewis, 1993; Lindstromberg and Boers, 2008; Nattinger and DeCarrico, 1992; Nation, 2001, 2013). Interest in collocations emerged as part of a general shift in the perception of vocabulary knowledge, from only secondary to grammar, to being seen as an essential component of second language learning and teaching. This is clearly reflected in Wilkins's (1972) statement: "Without grammar, little can be conveyed, without vocabulary, nothing can be conveyed" (p.111).

The focus on collocations increased most significantly after the publication of Michael Lewis' (1993) seminal book *The Lexical Approach,* which emphasized the importance of acquiring vocabulary, as lexical phrases rather than individual words, as a vital element of language competency and fluency. This idea is supported by corpus-based evidence showing that collocations constitute a large proportion of written and spoken discourse, far exceeding in number single words (e.g., up to two thirds of language was reported to be made up of multiword expressions including collocations; see Hill, 2001). This has led researchers to argue that 'lexical items' including collocations should be considered the basic units or building blocks of language, rather than single 'words' (e.g., Bogaards, 2001). Some have even gone as far as to claim that "learning a language is learning collocations" (Hausmann (1989) cited in Alzi'abi, 2017, p.50). However, even though there has been general agreement that an increased level of collocational competence plays a fundamental role in the

mastery of a second language, it is widely recognized that the acquisition of collocations is a problematic area for most language learners, even at advanced levels of proficiency.

One factor that has been proposed to account for this difficulty pertains to the semantic characteristics of collocations. Notably, collocations are not all the same semantically but rather differ in their degree of semantic transparency, which difference could be seen as a potential influencing factor on their acquisition. To shed light on this issue, the present thesis examines the extent to which the relative degree of semantic transparency could impact the acquisition of collocations in English as a Foreign Language (EFL) from a classroom-based perspective.

1.2 Statement of the problem

Collocational competence is a prerequisite for L2 learners who aspire to fluent command of the L2. Acquiring collocations significantly increases the effectiveness of communication (Lewis, 2000; Wray, 2002). Instead of composing and interpreting L2 discourse word by word, mastery of collocations enables L2 learners "to say more of what they want to say with the limited language resources at their disposal" (Lewis et al., 1997, p.33). Developing collocational knowledge not only helps L2 learners produce natural fluent utterances or 'lexical chunks' that are characteristic of native speakers' language; it also reduces the cognitive effort and processing challenges which learners experience when interpreting or producing L2 in real time (Shin and Nation, 2007; Conklin and Schmitt, 2008). Therefore, collocations should be integrated as a prominent aspect of L2 language instruction (Lewis 2000; Schmitt and Schmitt, 2020).

However, it is well documented that the acquisition of collocations is one of the biggest challenges for L2 learners (Barfield and Gyllstad, 2009; Nesselhauf, 2005; Altenberg and Granger, 2001). L2 learners of English use fewer collocations than native speakers and also produce non-native-like collocations. For example, some learners would produce **pass the*

law, **bring examples* and **stand in front of a problem* instead of *break the law*, *give examples* and *face a problem* (Laufer and Waldman, 2011, p.652). They also process collocations more slowly than native speakers do (Siyanova and Schmitt, 2008) and misinterpret linguistic input containing them (Martinez and Murphy, 2011). This raises the question of which factors account for these difficulties and how formal instruction can enhance L2 collocational development.

The difficulties L2 learners face in the acquisition of collocations have been attributed to variables such as their relative frequency, L1-L2 congruency (congruent collocations have a first language (L1) translational equivalent, while incongruent ones do not) and degree of semantic transparency of collocations. Numerous studies have shown that frequency (e.g., Sonbul, 2015; Nguyen and Webb, 2016) and L1-L2 congruency (e.g., Yamashita and Jiang, 2010; Phoocharoensil, 2011) are two of the main influential factors that significantly impact the acquisition of collocations. However, the effect of semantic transparency on the acquisition of collocations is a factor that has not previously received the attention it merits in L2 collocation research.

Semantic transparency refers to the extent to which (i) the meaning of the component words of a collocation contributes to its meaning at a phrasal level and (ii) the meaning of a collocation can be predicted or understood from the meanings of its two component words. Thus, collocations vary in their degree of semantic transparency, populating a place on a continuum between two extremes, with fully transparent collocations at one end and fully opaque ones at the other. It is assumed that more transparent collocations such as *make tea* whose overall meaning can be directly understood by simply combining the senses of its two component words will be easier to acquire than more opaque collocations such as *make the grade* (to succeed), which involves the learning burden of acquiring the meaning of both the

component words *make* and *grade* separately as well as their unified meaning when they are paired (examples from Revier, 2014, pp.82–83).

Several studies on compounds and idioms lend empirical support to the effect of relative semantic transparency on the learning of multiword expressions (e.g., Majuri, 2014; Wang and Gao, 2010; Mayila, 2010; Liao and Fukuya, 2004). Although researchers interested in the acquisition of collocations have begun to direct their attention to the characteristic of semantic transparency, only four studies to my knowledge have attempted to explore the potential influence of semantic transparency on the acquisition of L2 collocations (Huang, 2001; Revier, 2014; Macis and Schmitt, 2017a; Gyllstad and Wolter, 2016). However, all these studies suffer from serious methodological limitations which undermine their findings, such as the employment of inadequate methods to establish the semantic transparency of their tested collocations. In addition, none of these studies involved an intervention of any kind as all were explorative in nature, obtaining their data by one-shot collocation testing. Therefore, there is a need for a classroom-based intervention study that overcomes the weakness of past studies and sheds light on how learners acquire collocations with varying levels of semantic transparency in practice.

There have been no previous studies on the extent to which explicit instruction can be beneficial in supporting the learning of collocations with different levels of semantic transparency by low proficiency learners, and there are also few studies of EFL collocation acquisition by learners with L1 Arabic. Moreover, since all available pedagogical interventions, as well as all other collocational studies in general, have not adequately controlled for confounding variables such as prior knowledge of the collocations as well as their component words, a tightly controlled pedagogical study exploring the acquisition of collocations with varying gradations of semantic transparency is warranted, which this study aspires to accomplish.

1.3 Aims and research questions

The main aim of this thesis is to investigate the extent to which semantic transparency could potentially impact the learnability of verb + noun collocations in terms of both recognition and production. Based on the empirical evidence from idiom and compound studies, it would appear that a decrease in semantic transparency in a multiword expression leads to a greater learning burden, and so it is hypothesized that this will also hold true for the learning of collocations. The difficulty of learning less transparent collocations is expected to be more pronounced in production than perception, since it has been shown (as is true of many aspects of language acquisition) that learners' receptive acquisition of collocations precedes their production (e.g., Zughoul and Fattah, 2003; Koya, 2005). Verb + noun collocations were the type of collocations targeted for investigation in this thesis, mainly because these are often reported to be most challenging type of collocations for L2 learners in general (e.g., Nesselhauf 2005; Laufer and Waldman, 2011; Nguyen and Webb, 2016) and Arabic learners in particular (who are the targeted participants in this thesis) (e.g., Alotaibi, 2014; Abdul Ridha and Al-Riyali, 2011).

A key objective of this study was to address the gaps identified in the literature on collocations. Thus, this study explores the role of semantic transparency in collocation learnability by strictly controlling for prior knowledge of the component words of the targeted collocations, which past studies failed to do. It also focuses on lower proficiency learners with L1 Arabic who have rarely been the subject of scrutiny in previous pedagogical intervention studies. Moreover, in an attempt to improve the way in which semantic transparency was determined in past collocational studies, the present research evaluates the feasibility of establishing the semantic transparency of collocations by human transparency ratings and computational measures, which are two common methods employed to measure the transparency of other types of multiword expressions, such as compounds and idioms. A

further goal of this study is to examine the effectiveness of explicit teaching in connection with the learning of collocations with different degrees of semantic transparency.

In summary, this thesis sets out to answer the following primary question:

- To what extent does the degree of semantic transparency of English collocations affect their learnability by Saudi EFL learners in terms of both perception and production when prior familiarity is controlled for?

The study also addresses the following secondary questions:

- How effective is the explicit instruction employed in this study in supporting the learning of L2 collocations?
- Can human ratings and/or computational measures be considered feasible methods for establishing the semantic transparency of collocations?

To achieve the prime objective of this research, a pedagogical study was conducted employing a pretest/treatment/posttest design. Three groups of students (94 in total) who were studying EFL in Saudi Arabia received a pedagogical intervention involving the teaching of 44 targeted collocations with varying levels of semantic transparency, after which their learning gains in terms of both collocation recognition and production were tested and their test scores were quantitively analyzed.

1.4 The significance of the thesis

Research investigating the role of semantic transparency in the acquisition of L2 collocations is valuable for its pedagogical and theoretical implications. As this study has been pedagogically motivated, it is primarily intended to develop pedagogical implications for L2 classrooms. Webb et al. (2013) have rightly pointed out that "learners are likely to encounter collocations of varying degrees of semantic transparency and also with different meaning senses in [different] learning contexts" (p.93). In Martinez's (2013) proposed framework for the inclusion of multiword expressions in L2 classrooms, he argued for the

necessity of prioritizing more opaque expressions, which are assumed to be more difficult to learn than transparent ones, in L2 instruction regardless of their frequency, especially for L2 learners at a low proficiency level. The findings obtained from the present research could validate such a model of collocation instruction. This research is also intended to support teachers in making more informed decisions about which types of collocations are more likely to pose challenges to L2 learners based on their semantic properties and which might, therefore, warrant special attention in the classroom.

The pedagogical implications of this study are thus significant, as collocation instruction to date has mainly focused on merely teaching learners to notice which words pattern together. Little attention has been devoted to how the relative semantic transparency of collocations could affect their acquisition. Determining the influence of semantic transparency in the acquisition of collocations by L2 learners can assist teachers and educators in making more informed decisions as to which types of collocations are suitable for inclusion in L2 learning resources and vocabulary assessment. Moreover, evidence indicating that L2 collocations are learned differently based on their semantic transparency is expected to play a prominent role in any theoretical or pedagogical model of L2 collocation acquisition. Insights from this study may also provide a more theoretically complete picture of how L2 learners develop their knowledge of vocabulary. Thus, the findings of this study may be considered of great value to the field, especially in the Arabic context where English collocation instruction has not received much attention.

1.5 Outline

The remainder of this thesis is structured as follows. An overview of the literature on collocations is provided in chapters 2–4. Chapter 2 briefly reviews the different conceptualizations of the notion of collocations, evaluates their main characteristics, and also critically considers the notion of semantic transparency and the different methods used to

measure this characteristic. Chapter 3 reviews the literature on L2 collocations, focusing on the importance of collocations to L2 learners, the assessment of L2 perceptive and productive collocational knowledge, and the factors that affect the learnability of collocations. Within this critically reviewed research, the gaps that motivated this study are identified. Chapter 4 reviews the literature on vocabulary teaching, both in general and collocation instruction in particular, casting light on the main teaching practices and pedagogical interventions that could potentially promote the learning of collocations. Chapter 5 provides a detailed account of the process and criteria based on which the targeted collocations were selected. It also describes a study that examined the feasibility of using human ratings and distribution-based measures to establish the degree of semantic transparency of the selected collocations. Chapter 6 reports on the methodology, execution, analysis and results of the main pedagogical intervention study of this thesis, and is based on the results of the study reported in Chapter 5. Finally, Chapter 7 offers a general conclusion and a discussion of the main findings.

2 Collocations and Semantic Transparency

2.1 Introduction

The notion of collocation has been of central interest in both first and second language studies in recent years. It is based on the indisputable intuition that certain words tend to occur close to each other within a language. In English, for example, *make a decision* is preferred to **do a decision*, even though the latter combination seems syntactically and semantically possible. But despite its intuitive plausibility, and despite an "explosion of activity" across the fields of corpus linguistics, psycholinguistics, language learning and pedagogy research (Wray, 2012, p.23), collocation remains one of the most controversial concepts in linguistics (Bartsch, 2004; Evert, 2008; Seretan, 2011).

Etymologically, the term "collocation" is taken from the Latin word *collocare*, meaning "to place together, to assemble" (Seretan, 2011, p.30). The concept dates back to pedagogical work by Palmer (1933), who is considered a pioneer in collecting a list of more than 6,000 English collocations for his L2 students to be learned "as an integral whole and not pieced together from [their] component parts" (p.1). Palmer is also believed to be the first to use the term 'collocation', as it appears in the subtitle of his book *A Grammar of English Words*, to denote the sense of "recurrent, relatively fixed word combinations" (Bartsch, 2004, p.30). However, Firth (1957/ 1968) has been commonly credited as the first linguist to have introduced the concept of collocation as a technical term into linguistic theory.

Although various attempts have been made to capture the essence of collocation, there is no well-established or generally accepted definition other than the general characterization of collocations as regularly recurrent lexical combinations. Consequently, the term has been

used by various linguists to refer to different types of word combinations which, though obviously frequent in a given language, are challenging to explain based on commonly accepted models of linguistic description. The diversity of word combinations included under the term has led to tremendous confusion and many heterogeneous definitions in the literature. These various definitions reflect researchers' different conceptualizations of what constitutes a collocation and/or different methods of operationalising collocation for the purposes of different research projects (McKeown and Radev, 2000; Evert, 2008). The disadvantage of this wide variation in theoretical treatments is the absence of a consistently applicable set of criteria that can be used to sufficiently and clearly distinguish collocations in linguistic data from other types of word combinations, such as free combinations and idioms. Nevertheless, a number of criteria regularly crop up in the literature on collocation, including criteria that relate to semantic transparency.

The purpose of this chapter is to present a brief overview of the notions of 'collocation' and 'semantic transparency' as two key concepts in this thesis. Section 2 introduces the theoretical treatment of collocations. It illustrates the lack of consensus as to what constitutes a collocation and discusses the various characteristics that have been identified by researchers in the field, and the different ways they have been applied to the identification of collocations. The section also outlines how two research traditions, the phraseology- and frequency-oriented approaches,[1] gave rise to different notions of collocation that prioritised different criteria. One of these criteria, namely semantic transparency, is the focus of this thesis. Accordingly, Section 2.3 is mainly devoted to describing the methods commonly used

[1] Different terms have been used by linguists to refer to these two approaches: "statistically oriented" and "significance-oriented" by Herbst (1996); "frequency-based" and "phraseological" by Barfield and Gyllstad (2009) and Nesselhauf (2005); "quantitative" and "qualitative" by Bartsch (2004); "empirical" and "theoretical" by Evert (2008); and "statistical" and "linguistic" by Seretan (2011). This research employs the terms used by Barfield and Gyllstad (2009) and Nesselhauf (2005).

to measure this criterion. The chapter ends with a brief summary of the main points of the chapter.

2.2 Characteristics of collocations

2.2.1 Overview

The numerous published accounts of what constitutes a collocation reflect the still unresolved problem of identifying well-established classification criteria that clearly delimit collocations from other types of multiword expressions. Various possible criteria, and the different ways they have been applied, are summarized in Table 2.1. Researchers' selection of these criteria, the relative weight they give them, and the detail of how they apply them depend to some extent on the research tradition to which they belong. Scholars working in the tradition of phraseology (e.g., Cowie, 1981/1998; Mel'čuk, 1998; Hausmann, 1989) originally defined collocations in terms of their semantic and syntactic properties. In contrast, researchers using the frequency-based approach (e.g., Firth, 1957; Sinclair, 1974; Halliday, 1966) mainly considered the frequency of co-occurrence of two or more words as the defining characteristic. A collocation defined by one approach may not be defined as such by the other. For example, the combination *pull strings* was considered a collocation by Webb, Newton and Chang (2013, p.110) on the basis of co-occurrence frequency. However, the same combination would be considered an idiom by the purely phraseological approach, which distinguishes the two kinds of expression on the basis of degree of semantic transparency, since the meaning of *pull strings* – "to secretly use your influence with important people in order to get what you want or to help someone else" – is not semantically transparent (Gyllstad and Wolter, 2016, p.298).

Table 2.1: Characteristics of collocations and views regarding these characteristics by researchers using different approaches.

Characteristic	Approach and representative researchers		
	Frequency-based approach: Firth (1957), Sinclair (1966/1991), Halliday (1966), Kjellmer (1987/1994)	**Phraseological approach:** Cowie, (1981/1998), Howarth (1996/1998), Benson, Benson & Ilson (2010), Mel'čuk (1998), Nesselhauf (2005)	**Combined approach:** Stubbs (1995), Gries (2013), Bartsch (2004), Evert (2014), Seretan (2011)
Frequency of co-occurrence	Frequency of co-occurrence is considered the most prominent identification criterion of collocations. Researchers in this tradition are credited for developing practical computational procedures to operationalize this criterion.	Colocations are regarded as frequently co-occurring combinations of lexical items.	Frequency of co-occurrence is a central identification criterion of collocations.
Adjacency or proximity	The elements of collocations are mostly seen as not necessarily adjacent; for Sinclair (1966/1991) this means within a 4-window space to the right or left of the node word. For a few researchers, such as Kjellmer (1987/1994), the elements have to be adjacent.	Most researchers view the elements as necessarily adjacent. An exception is Hausmann (1989), who takes the view that the elements need not necessarily be adjacent.	For early followers of this approach, the elements are mostly seen as necessarily adjacent, but separated by additional elements where grammatically required. More recently, the elements are mostly seen as not necessarily adjacent. For example, Bartsch (2004) and Evert (2014), include 3 or 5 words to either side of the node word; in contrast, Seretan (2011) measures separation of collocational elements in terms of syntactic proximity rather than linear proximity.
Syntactic relation	Most researchers in the frequency-based approach are not concerned with this criterion. An exception is Kjellmer (1987/1994) who takes the view that collocations have grammatical structure.	Collocations are categorized as grammatical or lexical collocations. For some researchers, such as Hausmann (1989), collocations only consist of syntactically-related lexical words (i.e., content words only, with functional words excluded).	Collocations are categorized into grammatical or lexical collocations. The elements of collocations need to be syntactically related (for Seretan (2011) this is considered the main criterion).
Number of items	For most researchers in this tradition, collocations consist of two or more words; but for some, e.g., Sinclair (1966/1991), they are comprised of exactly two words.	Collocations mostly consist of two or more words, but for a few researchers, e.g., Mel'čuk (1998), they are comprised of exactly two words.	Collocations mostly consist of two or more words, but for some researchers, e.g., Gries (2013), they are comprised of exactly two words.
Nature of the elements	A collocation is usually seen as a relationship between derivationally-related lexemes. However, some researchers, such as Firth (1957), regard collocations as combinations of word forms.	Collocations are seen as a relationship between lexemes. (Cowie saw the elements of collocations as word forms but later viewed them as lexemes.)	Collocations are seen as a relationship between word forms or lexemes.
Restriction in lexical selection/ combinability: directional or mutual	Most of these researchers see the attraction between the elements of a collocation as bidirectional (an exception is Kjellmer 1987/1994) and they use statistical association measures for the application of this criterion.	Most such researchers consider this criterion as defining collocation; for Nesselhauf (2005), restriction in combinability is the chief criterion. The attraction between the elements is viewed as directional, and the application of this criterion is based on intuition.	Most of these researchers see the attraction between the elements of a collocation as directional, but they use statistical association measures for the application of this criterion.
Semantic transparency	Most researchers who used an exclusively frequency-based approach are not concerned with this criterion.	Most researchers in this tradition see collocations as semitransparent in meaning; this criterion is used to distinguish collocations from free combinations, which are transparent, and idioms, which are opaque.	Most researchers in this group view collocations as representing different levels of semantic transparency. Exceptions are Bartsch (2004) and Evert (2014), who regard all collocations as semitransparent.

Increasingly, researchers have realized that unifying these two different traditions could lead to a more fruitful approach to the identification of collocations, and this is also the view taken in this thesis. As both traditions have something to offer and are not necessarily mutually exclusive, contemporary researchers have attempted to combine aspects from the two original approaches in various ways. Advocates of this combined approach recognize that, by combining criteria that originated in different traditions, the identification of collocations can be made more rigorous. Sections 2.2.2–2.2.5 will discuss how each of the criteria shown in Table 2.1 have been applied.

2.2.2 Frequency and proximity

The minimal criterion that can be found in most definitions of collocations is the characteristic of frequent co-occurrence of at least two items. All researchers recognize that the frequent use of collocations by native speakers is what makes them conventionalized in language (Gyllstad, 2007, p.26); however, there is some variation in the application of this criterion. Early developers of the phraseological approach relied on their intuition to identify collocations (i.e., their perceived judgement that some words repeatedly co-occur in language), but they were not concerned with finding practical procedures to operationalize this defining characteristic. In contrast, proponents of the frequency-based approach gave more prominence to the characteristic of co-occurrence and made it empirically robust.

The first attempts to statistically quantify the notion of collocation were made by Halliday (1961, 1966) and Sinclair (1966), who are typical representatives of the frequency-based approach. Halliday (1961) defined collocation as:

> 'the syntagmatic association of lexical items, quantifiable, textually, as the probability that there will occur at n removes (a distance of n lexical items) from an item x, the items a, b, c ...' (Halliday 1961, p.276)

Sinclair (1966, p.145) developed Halliday's notion of co-occurrence at a certain distance, introducing the terms *node*, *span* and *collocate*. *Node* was used to refer to the word whose collocating ability is under examination, *span* to the number of lexical items on either side of the node that are considered relevant, and *collocates* to lexical items that co-occur with the node within that span. Sinclair (1991) reports that a span of four words to the right and left of the node word is optimal, in the sense that it avoids missing valuable evidence whilst cutting out extraneous noise that would be introduced by considering longer spans. These concepts have been indispensable in collocation research and essential to the operationalization of the notion of collocation to include not only consecutive co-occurring words (e.g., Kjellmer, 1987/1994), but also pairs or groups of words which are not necessarily adjacent (Sinclair, 1991, p.115). Most researchers now recognize that collocations can at very least be separated by certain elements such as articles for grammatical well-formedness (e.g., *perform **a** task*).

When it comes to operationalizing the frequency criterion for collocations, the simplest approach is just to count how often words occur together (within a given span) in some reference corpus; in this approach, recurrent word units have to pass a certain frequency threshold, such as a minimum of three, five or even 10 co-occurrences, within a given corpus, to qualify as collocations. Of course, the required raw frequency depends to some extent on the size of the corpus. For example, Kjellmer (1987/1994, p.133) considered a grammatically well-structured sequence of words to be a collocation if it occurred more than once in identical form in the Brown corpus. But the Brown corpus is by modern standards extremely small, consisting of only one million words; a frequency of two in the Brown corpus is equivalent to a frequency of 200 in the British National Corpus or a frequency of 2000 in the Corpus of Contemporary American English.

With the development of computational corpus linguistics, more sophisticated measures than simple co-occurrence frequency have come increasingly into use. Statistical association

measures such as mutual information (MI) have been used to determine the strength of the association between the co-occurring elements of a collocation, in which context MI reflects "the extent to which two words seek each other's company rather than the company of other words" (Webb, 2019, p.144). The use of such measures in computational corpus studies has helped in distinguishing collocations from word combinations that repeatedly occur by chance merely due to the sampling process. However, a certain level of raw frequency is required in order to apply statistical association measures such as MI, and corpus research suggests that three occurrences of a word combination is "a good lower threshold value allowing the application of statistical measures of co-occurrence significance" (Bartsch, 2004, p.60).

Even though the use of these statistical measures has proved to be an objective, practical method for the identification of collocations, they are not good at screening collocations based on their linguistic properties; hence, a drawback of reliance on the frequency criterion alone is the inclusion of very frequent combinations that are not collocations in the traditional intuitive sense, e.g., semantically incomplete word combinations such as *and the*, or proper names such as *Ford Motor Company* (cf. Wood, 2019, p.37). In this thesis, frequency information objectively obtained from a corpus will therefore be combined with other, more linguistically-informed criteria in the identification and selection of collocations.

2.2.3 Syntactic relation, number of items and nature of the elements

The phraseological and frequency-based traditions originally differed greatly in the importance they ascribed to the morphosyntactic nature of the elements of a collocation and the syntactic relation between them; in the phraseological approach, the morphosyntactic nature and patterns of the elements was a major concern. For example, Cowie (1998), a typical representative of this approach, defined collocations as the "co-occurrence of two or more lexical items as realizations of structural elements within a given syntactic pattern"

(p.132). However, within this tradition, different researchers classify these patterns in different ways and include different patterns in the set they regard as collocations. For instance, Hausmann (1989) considers that collocations mainly reflect the following lexical structures: "(a) noun + adjective (epithet); (b) noun + verb; (c) verb + noun (object); (d) verb + adverb; (e) adjective + adverb; (f) noun + (prep) + noun"[2] (p.1010, cited in Seretan, 2011, p.13). In contrast, Benson, Benson and Ilson (2010) include both lexical and grammatical combinations, regarding them as two subclasses of collocations. In their taxonomy, lexical collocations are composed of two or more content words, such as *pay tribute*, plus any necessary additional elements, usually an article as in *confirm a suspicion*; grammatical collocations contain a content word as well as a function word, such as a preposition, e.g., *immune to*. These authors' categorization of collocations based on their word class is widely employed in the collocational literature. However, they also recognise that not only the word classes of the elements but also the syntactic relation between them is important (e.g., the syntactic relation in the collocation *pay attention* is verb + object).

Not all adopters of the frequency-based approach are unconcerned with the syntactic properties of collocations; for example, Kjellmer (1987) considers it necessary for a word sequence to be "grammatically well-structured" in order to count as a collocation. Although Kjellmer does not explain what he means by this, from the pedagogical perspective taken in this thesis, some such criterion is essential to avoid classifying as collocations word strings that may occur several times in a corpus but do not constitute meaningful units of the language. In the present study, collocations are defined as lexical items in 'a direct syntactic relation', and specifically as verb + noun combinations in which the noun is part of the complement of the verb. However, the accurate application of this criterion with automatic (computational) identification tools is not straightforward. Although most corpora used for

[2] From a syntactic point of view, the lexical items identified in these structures represent the heads of phrases.

identifying collocations include part-of-speech tagging, the readily available tools are still not very precise at extracting collocations with the desired syntactic relations between their component words. One attempt to address this situation is Seretan (2011), who developed a computational collocation extraction method based on syntactic parsing or syntactic proximity between words (the parse-based approach). This method is shown to be superior to the traditional window-based approach that uses linear text proximity, in that fewer 'erroneous pairs' are identified as potential collocations; the parse-based method therefore produces smaller but better-quality lists of candidate collocations. However, the method requires rigorous and accurate computational tools that are not readily available for large corpora of English, or at least are not accessible to non-computational linguists. Generally speaking, to ensure the accurate application of the criterion of grammatical well-formedness, the researcher needs to manually apply their own grammatical knowledge to a set of candidate forms produced automatically from a corpus. For example, the strings 'arrest June' and 'arrested June' occur four and 12 times respectively in COCA, but always in contexts like *A 25-year-old man was arrested June 28*, where 'June' is part of an adjunct rather than the complement of 'arrest'. Thus, although 'arrest June' might be selected as a potential collocation on frequency grounds, it would be excluded from the present study on grammatical grounds. This combination of frequency-based extraction followed by manual checking was the method employed in the present study.

The syntactic properties of collocations are linked to considerations about what to count as the number of elements constituting a collocation. In the vast majority of definitions, collocations are unrestricted in length and composed of 'two or more words' (e.g., Aisenstadt, 1981; Cowie, 1981/1998), although some researchers restrict them to 'two lexical items' (e.g., Hausmann, 1989; Mel'čuk, 1998). Most definitions exclude functional items (e.g., determiners and prepositions) and some researchers (e.g., Bartsch, 2004; Tutin, 2008)

assume that the functional items are subordinate elements and not a necessary part of the collocation construction, except for specific idiomatic cases where the functional item is fixed (e.g., *spare **a** thought*, *bat **an** eyelid*). Nevertheless, even the most transparent collocation constructions are subject to the usual morphosyntactic rules of English, so that functional items are indispensable in certain contexts. For example, in the collocation *commit+ crime*, the complement of *commit* is a noun phrase headed by *crime*, so *commit crime/crimes/a crime/several crimes* are all possible. However, when the noun phrase is singular and indefinite, the additional functional element, in this case the determiner *a,* is essential (*commit a crime*). It is worth noting that many of the functional elements are often ignored in the automatic extraction process of collocations from corpora by many of the available window-based extraction methods and, therefore, researchers may need to do some manual rechecking and rely on their knowledge to judge whether or not a functional item is a necessary part of a collocation construction.

Early researchers in all approaches tended to regard collocations as involving a relationship between derivationally-related lexemes, where a lexeme is the set of inflected forms of a word, and derivationally-related lexemes are those related to one another by processes of word-formation. For example, Halliday (1966) used the term "lexical item" to refer to a set of related inflected and derivational forms. Accordingly, *a strong argument*, *the strength of his argument*, *his argument was strengthened* and *he argued strongly* would represent the same collocational pattern, because *strength*, *strong* and *strengthen* are three derivationally-related lexemes (p.151). Similarly, Mitchell (1971) (reported in Gyllstad, 2007, p.16) viewed collocations as roots or abstract units encompassing all inflectional and derivational forms of a word. Therefore, *heavy damage* is an abstraction which can be realized in syntactic patterns such as *damage heavily* (verb + adverb) and *heavily damaged* (adverb + passive participle). However, not all researchers agree that collocations involve

abstract units, and a few (e.g., Firth, 1957; Bartsch, 2004) regard the elements of collocations as word forms. Accordingly, word sequences such as *hold tight* and *holds tight* are seen as two different collocations. However, this view is rather radical, as it gives rise to numerous examples of collocations that differ only in inflections which do not have a substantial effect on the meaning of the collocation structure.

More recently, most researchers (e.g., Gyllstad, 2009) tend to adopt an intermediate position between those described in the previous paragraph, taking the constituents of collocations to be lexemes, i.e., encompassing inflectionally-related, but not derivationally-related word forms. Each lexeme is represented by its lemma (headword) and the whole collocation can also be represented in lemmatized form. Thus, *says a prayer*, *said a prayer* and *saying a prayer* are subsumed under the lemma *SAY + PRAYER*, and these forms can be included in the count when extracting collocation frequencies from corpus data (see examples in Gyllstad, 2007, p.23). An advantage of lemmatization when extracting collocations is that it allows the researcher to retrieve all related forms of the lexeme in a single search, rather than having to search for every word form separately. In the present study, I also regard collocations as being composed of lexemes. This is both for consistency with other recent studies and because inflectional variants of a collocation have the same surface syntactic structure, whereas derivational variants may vary in surface structure. For example, in both *strong arguments* and *a strong argument*, *STRONG* is an attributive modifier of an inflected/uninflected form of *ARGUMENT*, whereas in *the strength of his argument*, *ARGUMENT* might be analyzed as part of the complement of *STRENGTH*. The decision to use lexemes is therefore in keeping with the decision to consider syntactic structure in the selection of collocations.

2.2.4 Lexical selection and combinability restrictions

A further criterion that has been used to distinguish between collocations and other word combinations is that of restricted combinability/substitutability/lexical selection, sometimes referred to as 'selection preference'. This refers to whether and to what degree the constituents of a collocation can be substituted by other words. This criterion was first proposed by researchers following the phraseological approach. These researchers (e.g., Nesselhauf, 2005; Cowie, 1981/1998; Howarth, 1996/1998) hold that one of the constituent words of a collocation is semantically autonomous and expresses an unrestricted sense while the other constituent word expresses a special meaning or restricted sense 'selected' by the semantically autonomous word. For example, in the combinations *give a talk* and *school of fish*, the special meanings of *give* (rather than *make* or *hold*) and *school* (rather than *group* or *swarm* or *flock*) are selected by *talk* and *fish* respectively (Evert, 2008, p.2). This lexical restriction in collocations (e.g., *strong coffee* but not **powerful coffee*), is arbitrary, based on native speakers' usage conventions. For some researchers in the phraseological tradition, all collocations, by definition, have this kind of semi-transparent meaning (i.e., have one constituent that is used in a specialized sense while the other is not). On this view, collocation is directional, meaning that the occurrence of one lexical item leads to (predicts) the automatic selection of a certain co-occurring item. Accordingly, terms such as *base* and *collocator* for Hausmann (1989), and *keyword* and *value* for Mel'čuk (1998), have been used to indicate the distinct roles played by the elements of the collocation. *Base* and *keyword* refer to the element that is semantically autonomous and that predicts the other element, whereas *collocator* and *value* refer to the element that depends on the *base/keyword*; the *collocator*/*value* can only be interpreted with the intended sense through its co-occurrence with the *base/keyword* (e.g., *favour* is the keyword and *do* is the value in the combination *do a favour*) (cited in Nesselhauf, 2005, p.17). However, researchers who take this view of

collocation mostly rely on their intuition to judge directionality and the extent to which a word combination is restricted in the substitutability of its component words, making this a rather subjective and impractical method for the identification of collocations.

While lexical selection is viewed as 'directed' (asymmetrical) in the phraseological approach, the frequency-based approach views selection as symmetrical or mutual, as implied in Firth's (1957) notion of "an order of mutual expectancy" (p.181). In fact, followers of the frequency-based approach are credited for their useful operationalization of lexical selection with statistical association measures such as MI and t-score.[3] As the name 'mutual information' implies, such association measures usually assume that both component words predict each other equally. But, as argued by Gries (2013) (who adopts a combined approach), viewing the association between component words in a collocation as bidirectional/symmetric does not accurately reflect the nature of collocations, as it is often observed that, while one word in a collocation predicts the other, the opposite does not hold. For example, in the collocation *extenuating circumstances*, the word *extenuating* can predict *circumstances* more strongly than the other way around. To operationalize this directional aspect, Gries (2013) has proposed the use of Delta P,[4] an association measure that can grasp the directionality of collocations. However, the use of Delta P is still not as widely accepted nor as readily available as MI, which is provided automatically by corpus interfaces such as the BYU interface to the Corpus of Contemporary American English used in the present study (Davies 2008). In this thesis, I therefore use MI as a measure of the strength of attraction between lexical items.

[3] Both the MI and t-score are statistical measures "based on taking the observed frequency of the MWI [multiword item] in a corpus and comparing it with the expected frequency by which it would be expected to appear by chance if looking at the frequencies of the component words". While the MI measures how strongly two words are associated, it is often found to favor relatively low frequency words, e.g., *ultimate arbiter*. The t-score on the other hand measures the extent to which there being an association between words and favor high-frequency word pairs, e.g., *hard work* (Webb, 2019, p.397).

[4] A probability test that statistically measures the strength of the relationships between a word and the sequence in which it occurs.

2.2.5 Semantic transparency

Semantic transparency, which refers to the extent to which the component words of a multiword expression contribute to its whole meaning, has been used to define collocation, especially by researchers who view collocations from a phraseological standpoint. Combinations of words that frequently occur together in language often display different levels of semantic transparency. The combination *take the money*, for example, is considered to be "fully transparent," as its elements are used with their literal meanings and are therefore easily decodable. On the other hand, a "semi-transparent" combination such as *take a course*, in which only one element is used literally (*a course*), while the other is not, is not as easily decoded as fully transparent combinations. Finally, a combination such as *take sides* is considered to be "non-transparent" and the most difficult type to decode, as both its elements are used in non-literal senses (Henriksen, 2013, p.33; Revier, 2009, p.126). Various categorizations of collocations based on this characteristic have been adopted by different researchers, mainly reflecting the research tradition to which they belong and the different ways they have chosen to operationalize semantic transparency.

For most phraseological researchers, collocations represent a particular position in a hierarchy of semantic transparency. Such researchers define collocations as semi-transparent multi-word expressions, and regard them as having partially literal meanings (e.g., Cowie, 1981/1998, 1994; Howarth, 1996/1998). These researchers tend to view level of semantic transparency and degree of substitutability as the two main criteria that distinguish collocations from other word combinations, including free combinations on the one hand, and idioms on the other. In this tradition, a word combination is considered to be a collocation if it is limited to some extent in its substitutability and has one element used in its literal sense while the other has no literal meaning. For example, in the expressions *kick a habit* and *heavy rain*, both *kick* and *heavy* are used in non-literal senses while *habit* and *rain* are used literally;

these expressions are therefore regarded as collocations in the phraseological approach. On this view, multi-word expressions where both elements are literal in meaning and unlimited in their substitutability are regarded as free combinations (e.g., *drink tea*). At the other end of the spectrum, the phraseological tradition reserves the categorization 'idiom' for two subtypes: a figurative idiom, which is a word combination that has a figurative or metaphorical meaning in addition to a literal interpretation but is very limited in the substitutability of its elements (e.g., *do a U-turn*); and a pure idiom, which has only a figurative meaning and does not allow substitution of its lexical elements (e.g., *blow the gaff*). Several other researchers have used degree of semantic transparency as a criterion to delimit collocations from idioms, while other criteria, such as restricted substitutability (e.g., Hausmann, 1989; Benson, Benson and Ilson, 2010) or statistical frequency of co-occurrence (e.g., Gyllstad and Wolter, 2016), have been used to differentiate collocations from free combinations. However, in general, researchers working in the phraseological tradition restrict collocations, by definition, to one discrete level of semantic transparency, i.e. semi-transparent.

In contrast to the phraseologists, most researchers who adopt a combined approach to the definition of collocations (e.g., Gyllstad, 2007, Revier, 2009, 2014) are generally not overly concerned with having a clear-cut categorization of different types of multiword expressions; they recognize that it is sometimes difficult to delimit one type from another in a straightforward manner, and that such categorization tends to be largely subjective. To distinguish between collocations and free combinations, mixed-approach researchers usually depend on statistical and syntactic criteria, which can more easily be objectively operationalized than semantic criteria. In this approach, collocations are viewed as word combinations that have a statistically significant tendency to co-occur and that have some syntactic relationship between their elements. Clearly, this definition allows for some

variability, depending on the level of significance set and the type of syntactic relationship required. Furthermore, such a definition leads to including as collocations some multiword expressions that would be judged as idioms in the phraseological tradition. One advantage of this approach is that it eliminates the subjective aspect from the identification of collocations. A consequence is that collocations are regarded as having varying degrees of semantic transparency, rather than a single level. This inclusive view may in fact be more realistic from the perspective of L2 learners, who will encounter multiword expressions with varying degrees of semantic transparency, rather than two or three clearly differentiated types. However, most combined approach researchers (e.g., Gyllstad, 2007, Revier, 2009, 2014) have adopted a three-fold classification in which collocations are categorized at three discrete levels of semantic transparency: fully transparent; semi-transparent; and fully opaque. In other words, their approach to semantic transparency is essentially similar to that of the phraseologists, except that they do not use it as a criterion for distinguishing between free combinations, collocations and idioms.

The three-fold classification of multiword expressions as transparent, semi-transparent or opaque, though widely adopted, does not fully capture the nature of semantic transparency. For example, some combinations that might be classed as fully transparent nevertheless constrain the meaning of one of their constituents, e.g., the sense of *white* in *white wine* is not the same as the sense of *white* in *white snow*. Combinations that might be classed as semi-transparent also show variation in the contribution of the non-literal constituent. In some cases, an element takes on a specific meaning by metaphorical extension of its meaning outside the combination. For example, the adjective *stiff* in the collocation *stiff drink* and the verb *surf* in the collocation *surf the Internet* denote the specific figurative meanings of ‘intense, strong’ and ‘browse web pages for information’ respectively, which are metaphorical extensions of their basic senses ‘not easily bent’ for *stiff*, and ‘to ride on the top

of a wave' for *surf*. In other cases, the non-literal constituent is not so much metaphorical as semantically bleached, as seen very clearly in collocations with delexicalized verbs. Collocations such as *give a smile, have a talk* and *make a confession* contain delexicalized verbs, which are sometimes described as empty verbs or light verbs as they contribute little to the meaning of the word combination. In *give a smile,* for example, the verb *give* loses some of its full meaning as a free-standing verb, whereas the other constituent in the collocation, *smile,* retains its full meaning. It is difficult to capture these various degrees of semantic transparency with limited numbers of discrete categories such as those proposed by most researchers in collocational research. An alternative is to view semantic transparency as scalar and a property of not only the component words of a collocation but also of the whole collocation. Taking into account the meaning of the whole expression is especially important in an approach that does not differentiate between collocations and idioms, since on that view a collocation's meaning is not necessarily deducible as a function of the meaning of its constituents. This alternative approach, which has been used successfully in research on the semantic transparency of compounds (e.g., Marelli and Luzzatti, 2012; Reddy, McCarthy and Manandhar, 2011), is adopted in the present study.

A second problem with previous studies on the semantic transparency of collocations is that the authors either do not state how they measured the semantic transparency of the collocations, or they mainly relied on their own intuition. This is a weakness in these studies since they depended on a very subjective and unreliable technique to determine semantic transparency. To adequately assess the degree to which various multiword units are semantically transparent, one needs a more reliable way of measuring transparency. It could then of course be decided that only combinations with a certain level of transparency count as 'collocations,' which would be simply a matter of definition. However, irrespective of the definition adopted, the first step is to have a means of determining whether a combination is

transparent or, in a gradient view, its degree of transparency. Prior to the present study, more progress had been made in this respect for types of multiword expression that were not classed as collocations by the researchers concerned. The following section discusses the methods used in the relevant research.

2.3 Measuring Semantic Transparency

2.3.1 Overview

This section discusses the most common approaches that have been employed to evaluate the relative semantic transparency of multiword units, including collocations. As the majority of work carried out on the topic of semantic transparency has been on compounds, this will be reflected here, compounds being relatively similar to collocations according to the frequency-based view.

Semantic transparency has been measured in the multiword literature in general, and more specifically in the compound literature, using three main methods. In the first method, researchers use their own judgements to categorize compounds as opaque, semi-transparent or transparent (e.g., Sandra, 1990; Ji, Gagné and Spalding, 2011). This has also been the primary approach in the few previous collocation studies that have focused on semantic transparency (e.g., Huang, 2001; Revier, 2014; and Gyllstad and Wolter, 2016). In addition to his own intuition, Revier (2014) also relied on a learner dictionary to assess the semantics of the individual constituents, as he assumed that, if the meaning of a constituent word matched one of the first listed entries of that word, it could be classified as transparent. At the same time, he recognized that this method of establishing semantic transparency was unsatisfactory and needed refinement in future research. By contrast, Gyllstad and Wolter (2016) included the judgments of two experts on phraseology in addition to their own intuitions to classify their verb-noun combinations as transparent (free combinations) or semi-transparent (collocations).

The second method to establish the degree of semantic transparency of complex words that has gained recent popularity is the use of distributional semantic-related measures (e.g., Kuperman, 2013; Wang et al., 2010). In this method, computational measures are employed to estimate the "semantic similarity between the meanings of words based on (their) patterns of co-occurrence in similar contexts" in a large corpus (Gagné, Spalding and Nisbet, 2016, p.7). This method will be discussed in more detail in Section 2.3.2 below.

The third measure, which is the most commonly used method in establishing more reliably the semantic transparency of complex words, is human ratings of transparency. This is of course essentially the same as the first method, except that it uses the intuition of numerous people instead of solely relying on the researcher's own judgment.

2.3.2 Human Ratings

Generally, to obtain human ratings of the semantic transparency of a set of complex words, researchers design rating tasks that include Likert-type scales to elicit their participants' perceptions. However, the specifics of the design of the rating tasks have differed for each researcher. One important detail in which these tasks vary is related to the way in which semantic transparency has been conceptualized. Primarily, two types of questions have been employed in these tasks. The first type of question asks raters to judge the extent to which the meaning of the complex expression as a whole can be predicted from its constituents. The second type of question asks raters to judge the extent to which each constituent, rated separately, retains its individual meaning in the complex expression. Some researchers have used either one of these questions exclusively, while others have combined both questions to measure the semantic transparency of their expressions of interest.

Researchers have differed with respect to the range of the Likert-type scale used in semantic rating tasks and how many categories of semantic transparency they have defined. Some researchers have used a five-point scale (Zwitserlood, 1994; Libben et al., 2003), while

others have used a seven-point scale (Juhasz, 2007). Based on the ratings obtained from such scales, these researchers have then classified complex words into two categories: opaque and transparent (e.g., Juhasz, 2007); three categories: fully transparent, partially transparent and fully opaque (e.g., Zwitserlood, 1994); or four categories (e.g., Libben et al., 2003) as follows:

> TT (transparent–transparent) (e.g., *car-wash*)
> OT (opaque–transparent) (e.g., *strawberry*)
> TO (transparent–opaque) (e.g., *jailbird*)
> OO (opaque–opaque) (e.g., *hogwash*).
>
> (Libben et al., 2003, p.53)

Despite the fact that they have so often been used, it is widely acknowledged by researchers that categorical taxonomies of semantic transparency, even Libben et al.'s (2003) very influential four-fold classification, do not adequately capture the phenomenon. This is because, as discussed above, semantic transparency actually shows fine-grained variation and is difficult to quantify in clear-cut categories. In fact, transparency may be more realistically viewed as extending over a continuum between two extremes, viz, fully transparent at one extreme and fully opaque at the other (Macis and Schmitt, 2017a). As stated by Bell and Schäfer (2016) "human ratings of transparency actually produce continuous variation; the need to reduce these ratings to discrete levels comes from factorial experimental designs, which, as Marelli and Luzzatti (2012) point out, may obscure some effects" (p.163). Macis and Schmitt (2017a), who adopt a continuum view of semantic transparency, are also the only authors who have previously used multiple human ratings to measure the semantic transparency of collocations. They collected ratings from 18 raters, who were non-native speakers of English, for verb-noun and adjective-noun combinations with both figurative and literal meanings. However, although the ratings generated a good range of relative semantic transparency, there was poor agreement between individual raters. This underscores the necessity of providing clear instructions and averaging results over a large number of raters

for the validity of the method. In the present study, for the reasons outlined above, semantic transparency will also be considered a continuous variable. However, steps will be taken to further improve on the methodology of Macis and Schmitt (2017a), specifically by adapting the approach of Reddy, McCarthy and Manandhar (2011), who developed a very rigorous methodology for compounds.

Since Reddy, McCarthy and Manandhar (2011) had a central influence on the methodology of the present study, what follows is a detailed description of their human transparency rating procedure. Although these authors did not explicitly use the term "semantic transparency" in their work, they defined "compositionality" in the same way as semantic transparency is operationalized by the first type of question described in the previous paragraph. They maintain that "[a] *compound is compositional if its meaning can be understood from the literal (simplex) meaning of its parts*" (p.211, italicized in original). Because they wanted to select a sample of compounds that would have varying degrees of semantic transparency, Reddy et al. (2011) started by aiming to have representatives of all four classes postulated by Libben et al. (2003). In the first class, both constituent words of a compound are used literally; in the second class, only the first word is used literally, and the second is used in a non-literal sense; in the third class, the first word is used non-literally but the second is used literally; and in the fourth class, both words of the compound are used non-literally. Reddy et al. based their initial classification of the transparency of a compound on whether its constituent words appeared either in its definition in the lexical database Wordnet (Fellbaum, 1998) or in the hypernym hierarchy of that compound in Wordnet. They assumed that if a constituent appears in the definition or hypernym hierarchy of a compound, it is likely to be relatively transparent in that compound. In *swimming pool*, for example, *swimming* occurs in the WordNet definition of *swimming pool* and *pool* exists in the hypernymy hierarchy of *swimming pool*, since a swimming pool is a type of pool. It was

therefore predicted that *swimming pool* would be rated as relatively transparent. In contrast, in *zebra crossing*, for example, only one constituent, *crossing*, appears in either the definition or hypernym hierarchy, and in *smoking gun* (with its metaphorical reading) neither constituent does (Reddy, McCarthy and Manandhar, 2011, p.212). The final set consisted of 90 compounds that were expected to represent a range of transparencies based on this relatively coarse initial screening. Each compound also needed to have at least 50 occurrences in the ukWaC corpus of English (Ferraresi et al., 2008) to be included in the set. This frequency criterion facilitated the use of distributional semantic techniques which were also part of the study.

For each compound in their dataset, Reddy et al. asked three questions: how literal was the compound, how literally was the first component word used in the compound, and how literally was the second component word used (Reddy, McCarthy and Manandhar, p.211). To control for ambiguity, each compound was presented with a definition from either WordNet or Wiktionary; in some cases, where the definitions were absent from these sources, the definitions were provided by the researchers themselves. In the few instances where a compound generated two readings, two definitions were offered from which the raters were asked to select what they felt to be the most frequent definition and base their rating on that. To decrease ambiguity, the compounds were also presented in contexts; each compound was presented in five example sentences randomly selected from the ukWaC corpus. Raters were asked to base their rating on the most frequent definition based on the example sentences. The rating was on a six-point scale that ranged between 0 (“Not to be understood literally at all”) and 5 (“To be understood very literally”).

Amazon Mechanical Turk (AMT), a crowd-sourcing service, was used to find qualified raters for the rating task (https://www.mturk.com/mturk/welcome); only raters who passed a qualification test were recruited. As a further way to control the quality of the ratings and to

measure raters' level of agreement, a Spearman correlation score (ρ) that correlated all the rating values of all the raters was calculated, and only those with a score (ρ) greater than +0.6 were accepted. In addition, the proximity of the task rating to the task mean (viz, within a range of ±1.5) was an additional criterion for accepting or rejecting raters. The rating procedure was explained to the raters using written instructions that included four examples of rated compounds with some explanation of how they had been rated. In an effort to lower the effect of individual rater bias on the overall results, the three different tasks for each compound were randomly assigned to 30 out of the 151 qualified raters. In this way, each rater was more likely to work on only one or two of the task types for each compound. The analysis of the semantic ratings revealed a clear continuum of semantic transparency – or compositionality in the authors' terms – for their dataset. This rigorously developed method was adapted for the present study.

2.3.3 Computational Measures

One method for estimating the semantic transparency of multiword expressions which is increasingly growing in popularity is distributional semantics. The advantage of this method is that it is automatic, depending on computational calculations; however, expertise is required to be able to perform these calculations. The method is based on the Distributional Hypothesis, which states that words that often occur in similar textual contexts tend to have similar meanings (Harris, 1954, p.14). The method assumes that the meaning of a word can be represented as a co-occurrence vector which is built from a corpus (Reddy, McCarthy and Manandhar, 2011). This vector of word meanings reflects the number of times a target word co-occurs with a set of context words or "reference words" in a large corpus. These reference words are found in the context around the targeted word in the corpus within a certain contextual window size that could be as short as a few words or as long as a whole document.

A matrix of co-occurrences can be constructed in which words of interest are the rows of the matrix and the reference words are the columns, or vice-versa.

An example of a co-occurrence matrix is shown in Figure 2.1 for the target words *automobile*, *car*, *soccer* and *football*, with the context words *wheel*, *transport*, *passenger*, *tournament*, *London*, *goal* and *match*. In this word-by-word matrix, the meaning of *football* is similar to that of *soccer*, as its context vector (represented by the row corresponding to *football* in the matrix) largely overlaps in the number of common reference words (represented by columns in the matrix) with the context vector for *soccer*. This means that many of the words surrounding occurrences of *football*, within a specified contextual window such as the context of a sentence, are the same words as those surrounding occurrences of *soccer*; in this small example, *wheel*, *transport* and *passenger* occur with both *soccer* and *football*. Similar patterns can be observed for *car* and *automobile*, reflecting their semantic similarity. However, no such pattern is seen for other pairings of words. For example, *automobile* and *soccer* have a zero overlap in the reference words in their surrounding context (see Clark, 2015, p.10).

	wheel	transport	passenger	Tournament	London	goal	match
Automobile	1	1	1	0	0	0	0
Car	1	2	1	0	1	0	0
Soccer	0	0	0	1	1	1	1
Football	0	0	1	1	1	2	1

Figure 2.1: Matrix recording the number of times the target words automobile, car, soccer and football co-occur with the context words wheel, transport, passenger, tournament, London, goal and match.

(Clark, 2015, p.11)

The degree of semantic similarity between the meanings of any two words can be computed from a co-occurrence matrix, such as the one shown in Figure 2.1, by using geometric methods. One common measure is the cosine of the angle between the vectors representing the meanings of the words being compared. In a simple (made-up) example of a

two-dimensional word space, shown below in Figure 2.2, the semantic similarity between *soccer* and *football* can be computed by calculating the cosine of angle α, i.e., the angle between the meaning vectors of these two words. Likewise, the similarity between *car* and *automobile* can be calculated as the cosine of angle β. The cosine values for positive vectors range between 0 and 1 (all values are positive because co-occurrence frequencies cannot be less than zero). As the cosine value approaches 1, it indicates a closer semantic similarity between the compared vectors, while a cosine value closer to 0 reflects a lack of semantic similarity. The diagram in Figure 2.2 is only two dimensional to make it possible to represent it visually on the page. However, in a multi-dimensional word space representing a large number of reference words, the same computations can be conducted with the same principles but not as easily visualized.

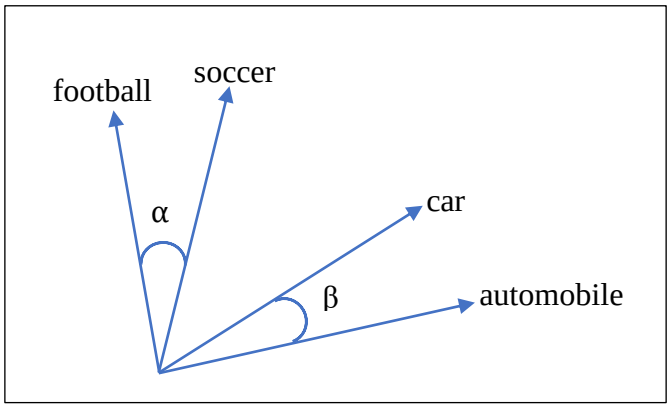


Figure 2.2: Two-dimensional Word Space

The last few decades have witnessed a growing interest in the use of distributional semantics-based measures to quantitively and automatically estimate the semantic transparency of complex words. For instance, Baldwin et al. (2003) and McCarthy, Keller and Carroll (2003) determined the semantic transparency of phrasal verbs and verb particles respectively by comparing the distributions of each of the individual constituents to the distributions of the entire multiword expressions, using Latent Semantic Analysis (a technique that implements distributional-semantics methods). Their rationale was based on

the assumption that more compositional, i.e., more semantically transparent, multiword expressions are expected to appear in contexts similar to those in which their component words appear. Compounds have been the most common type of complex words to be ranked according to their semantic transparency levels by distributional-based measures. For example, in their investigation of the effect of semantic transparency on lexical decision tasks with two-constituent compounds, Marelli et al. (2015) relied on distributional semantics as a measure of semantic transparency. For each compound form, they calculated two distributional measures, one computed by measuring the semantic similarity of the compound to its first constituent, the other by measuring the semantic similarity of the compound to its second constituent. Using similar methods, both Reddy, McCarthy and Manandhar (2011) and Wang et al. (2014), found that distributional semantic measures were strong predictors of human transparency judgments of compounds. Based on their findings, the latter study argued for the superiority of the distributional-based semantic method over human judgments in estimating semantic transparency, maintaining that '[s]ubjective differences and ambiguity of transparency make judgments difficult, and a computational alternative based on a general model might be a way to average across subjective differences' (p.284).

Of all multiword expressions, collocations have received the least attention with regards to the use of computational methods to measure their relative semantic transparency. However, the same principles or core ideas implemented in the computation of semantic transparency for other multiword expressions can be applied to calculate the semantic transparency levels of collocations. This can be done by calculating the frequency with which each of the two component words of a collocation, when they are not part of the collocation, co-occur with a set of reference words. The idea behind this is to measure the extent to which the two constituent words of the collocation tend to occur in similar kinds of text or context as one another. If words tend to occur in the same sorts of contexts, they will also occur with

the same reference words. For example, words that occur in texts about education will often occur in the same sentence as words like *school*, *teacher* and *student*. Therefore, calculating the cosine similarity between the vectors of the two component words of a collocation also measures the extent to which they belong to the same semantic fields. This is of course when only the occurrences outside of the collocation are considered; in the context of the collocation, the two words will have similar distributions by definition. Semantic vectors for words, also called 'word embeddings', can now be downloaded from such repositories as Fares et al. (2017); Mikolov et al. (2018); and Pennington, Socher and Manning (2014).

2.4 Summary

This chapter has presented a brief overview of the various conceptualizations of collocations in linguistic research and the different criteria used to identify them. It has shed special light on the semantic transparency criterion as this is a central concept in the present study. The chapter has also highlighted the lack of firm consensus as to the definition of the concept of collocation and has shown that researchers have differed in their choice of defining criteria, the relative prominence they give them and the detail of how they apply them, depending to some extent on the research tradition to which they belong. More recently, researchers have tended to combine aspects of the frequency-based and phraseological approaches in different ways, opting for a combined approach to defining collocation, which builds on the positive aspects of both traditions.

The chapter has also discussed some of the key characteristic criteria that are widely accepted by researchers and critically evaluated the various ways these have been applied to identifying collocations. I have emphasized frequency of co-occurrence as an essential characteristic of collocations and discussed how advances in computational corpus tools made the application of this criterion significantly more successful. I have also underscored important syntactic characteristics of collocations pertaining to their being syntactically

related word combinations that are subject to the usual morphosyntactic rules of English and might therefore need certain elements other than the main component words to be grammatically well-structured. The chapter has given special emphasis to the property of semantic transparency since this is the main factor under scrutiny in the present research. On the view of collocation used in this study, collocations are not defined as having a certain level of semantic transparency but are regarded as a set of multiword expressions with varying levels of transparency along a continuum from fully transparent to fully opaque. This view opens up the possibility that the level of semantic transparency of a collocation might be correlated with other properties, including its ease of learnability by speakers of other languages. The chapter has also presented a brief outline of the common approaches employed in the literature to the assessment of semantic transparency, and especially those adopted in this study. Overall, the chapter has provided a general overview of two important notions in this thesis, namely collocation and semantic transparency.

3 L2 Collocations Research

3.1 Introduction

It is well established that acquisition of formulaic language units, especially collocations, is a fundamental component of L1 and L2 language competence (Lewis, 2000). Command of these formulaic units has been shown to lead to fluent, native-like use of language (Ellis, 1996), as well as effective communication (Lewis, 1997). Their observed omnipresence in language renders them essential for successful language comprehension and use (Hill, 2001), and their recognized significance in the context of L2 learning has sparked a growing body of research interest in the last three decades. Though slow-moving at the outset, this research effort increased rapidly in the late 1990s, spurred by the seminal works of Nattinger and DeCarrico (1992) and Lewis (1997, 2000) and facilitated by the development of learner corpora and computer-mediated tools. This chapter briefly reviews previous research on collocations in the context of ESL/EFL learners, with the objective of highlighting the gaps that motivated the present study. The review is organized under the three following sub-topics, based on the reviewed studies' thematic focus. First, Section 3.2 discusses the significance of mastering collocations for L2 learners. Second, Section 3.3 surveys methods used to assess L2 collocational competence. Third, Section 3.4 reviews studies investigating key factors that hinder or facilitate the acquisition of L2 collocations. A short summary is included at the end of the chapter.

3.2 Significance of collocations in L2 acquisition

One of the reasons why collocations are considered central to the acquisition of a second language, and specifically L2 English, is their widespread use in native speakers' spoken and written discourse (Martinez and Schmitt, 2012; Wray, 2008; Schmitt and Schmitt, 2020;

Meunier and Granger, 2008). According to Erman and Warren (2000), on average about 50% of words in written and spoken English are part of preconstructed multiword combinations; other frequency estimates for multiword sequences reach as high as 80% of the total words in the London-Lund Corpus, as reported by Altenberg (1998). In view of their frequent occurrence, these multiword units are clearly as important as single words in the acquisition of English. Furthermore, by any of the definitions discussed in the previous chapter, collocations are a frequently occurring type of multiword sequence. For example, in his analysis of 240,000 words written by native speakers of English, Howarth (1998) found that more than a third of the word combinations identified were collocations or idioms in the phraseological sense, i.e., collocations as defined in the present study. If the language in general is largely made up of institutionalized multiword combinations including collocations, this means that native speakers use large numbers of them, probably amounting to several hundred thousand types, according to Pawley and Syder (1983).

The great prevalence of multiword units in language may be related to a processing advantage. Extensive evidence from psycholinguistic research has shown that prefabricated sequences are processed faster than language that is creatively generated. For example, Conklin and Schmitt (2008) found faster processing speeds for reading multiword sequences compared to non-formulaic sequences in both native and non-native speakers. Similarly, the results of the grammaticality judgment tasks in Jiang and Nekrasova (2007) revealed that formulaic sequences were processed more quickly and accurately than the non-formulaic controls. Relying on a high percentage of multiword units under time constraints—in the case of weather reporters or auctioneers, for instance—can enhance fluency in speaking (e.g., Kuiper, 2004; Schmitt, Grandage and Adolphs, 2004). Command of these memorized word combinations can ease the brain's processing load and thus promote effective communication and enhance language fluency (Wray, 2002). The assumption is that memorization, storage

and retrieval are less costly than computation in terms of the mental resources required. The processing advantage of using multiword units may be especially helpful for L2 learners, whose L2 resources are likely to be more limited than those of native speakers, and for whom L2 processing presumably entails an additional cognitive load relative to L1.

Despite the processing advantage of collocations, there is evidence that L2 learners are slow to acquire them. A number of corpus studies have compared the production of collocations by L2 learners of English with that of native speakers. Examples of such corpus-based studies include Howarth (1998), Granger (1998), Lorenz (1999), Nesselhauf (2005), Fan (2009) and Laufer and Waldman (2011). One common finding is that L2 learners under-use collocations compared to L1 productive norms. For example, Granger (1998), Lorenz (1999) and Fan (2009) all conducted comparative analyses of a learner corpus and native speakers' corpus, restricting their analyses to adverb + adjective collocations. These analyses revealed a statistically significant under-use of native-like collocations by learners from different L1s (French in Granger; German in Lorenz; and Chinese in Fan) in terms of both tokens and types. Compared with native speakers, learners were more likely to use general purpose intensifiers such as ***totally, completely*** and ***very*** with a wide range of adjectives, rather than more specific combinations such as ***readily available*** or ***bitterly cold***. This led these researchers to conclude that the learners were relying more on computation using a limited number of simple lexical items, than on retrieval of multiword units. Similarly, Laufer and Waldman (2011) examined verb + noun L2 collocational knowledge in the writing of Hebrew learners of English at three proficiency levels: basic; intermediate; and advanced. They found that, regardless of their proficiency level, the learners produced fewer collocations than native speakers, where the definition of collocation was that the combination should be listed in either of two dictionaries of collocations. About one third of all verb + noun combinations produced by the learners were atypical of native speaker usage,

occurring neither in the collocational dictionaries nor in the British National Corpus, e.g., *spell a language*, *learn children* and *enlarge my opinion*. L1 transfer was the major source of these non-native-like combinations, which persisted even at advanced levels of proficiency. Again, this suggests that learners may be translating word-by-word from their L1, rather than learning multiword chunks of the target L2.

Even though L2 learners appear not to use collocation to the same extent as L1 speakers, numerous studies illustrate a strong association between mastery of collocations and general L2 English proficiency, as well as specific linguistic skills such as speaking and writing. Examples of such studies are Al-Zahrani (1998) and Bonk (2001), both of whom explored whether L2 collocational competence develops in parallel with general linguistic proficiency across different proficiency levels. Both studies used gap-filling tests to elicit the verbal element of verb-noun collocations. Their results indicated a high level of correlation between knowledge of the targeted collocations and general linguistic proficiency, which was measured by TOEFL[5] test scores, suggesting that L2 collocational competence supports and grows along with overall proficiency in the language. In Gyllstad (2007), L2 collocational competence (measured by the purpose-designed tests COLLEX and COLLMATCH) was found to increase alongside general vocabulary knowledge, measured by a Vocabulary Levels test. Similarly, a strong correlation has been found between oral proficiency and use of collocations. For example, Boers et al. (2006) showed that oral proficiency, taking into account fluency, range of expression and accuracy, rated by two experienced, non-native EFL teachers, correlated with the number of collocations used, rated by two different non-native, experienced EFL teachers. Sung (2003) (using a gap-filling collocation test) and Mohajeri and Ketabi (2013) (using matching and gap-filling collocation tests) also found a correlation

[5] Test of English as a Foreign Language, by contrast with IELTS (International English Language Testing System). Both are widely used standardized tests measuring the English language skills of non-native speakers seeking entry to English-speaking universities which require such a test as a proof of English proficiency.

between lexical collocational knowledge and speaking proficiency demonstrated by their subjects' scores in an IELTS[5] speaking test. Although these correlations do not tell us anything about causation, there is little doubt that use of collocations is somehow related to proficiency in L2 English, at least as measured by standard tests or the perceptions of EFL teachers.

For speakers of English as a second or other language, competence in using collocations is often linked to native-like fluency in English. However, there are two issues related to this premise. Firstly, it is debatable whether 'native-like' is the appropriate target for L2 learners and secondly, even if it is, there is a question about what should be considered native-like. On the second point, scholars in sociolinguistics, applied linguistics and TESOL now talk about 'Englishes' rather than 'English,' and some even recognize ELF (English as a Lingua Franca) as a variety in its own right (e.g., Antle, 2018). Nevertheless, the target of many EFL learners and educational testing regimes is one of the standard L1 varieties, usually Standard Southern British English or General American English. Regarding the appropriate target level of proficiency, this depends on the aspirations of the individual learner and the use to which the target language will be put. While there are undoubtedly many learners for whom a basic level of comprehensibility is adequate, there are also many that for various reasons do aspire to a native-like standard, and it is impossible at the outset of school education to predict which learners will eventually fall into the latter group (cf. Nesselhauf 2005 pp 37-40). However, it seems unlikely that it would be helpful to change the target mid-way through the educational process, for example starting off by teaching 'English as an International Language' (English as spoken in international settings mainly between non-native speakers; Modiano 1999) then shifting to a standard variety for those who want to go further. Rather, the normal solution is to use a standard variety as a model from the outset, while recognizing that learners will actually develop their own interlanguages at various points on a continuum

towards that model. For school-aged learners in KSA, who are the main participants in the present study, American English is the most common variety used in both the education system and social circles (Alshammari, 2016). This is the standard on which their instruction is based, against which their attainment in the language is formally assessed, and towards which their interlanguage is assumed to be developing. Consequently, in the present study, selection of collocations and evaluation of learners' collocational knowledge will be based on General American. As discussed above, the standard varieties of English make extensive use of collocations and it therefore behoves teachers in this system to take steps to help learners acquire them.

3.3 Assessing collocational knowledge in L2 English

3.3.1 Productive knowledge

Corpus studies, such as those reported in the previous section, can provide information about collocation use by L2 learners generally. However, because they are based on samples of relatively uncontrolled production, they are of limited use in attempting to tease apart the various factors that might influence the acquisition of collocations. Furthermore, they represent what learners produced in a certain context, which may not be the same as what they are capable of producing. For example, given the freedom to do so, some learners use avoidance strategies, preferring to rely on those linguistic patterns about which they feel most confident (Yamashita and Jiang 2010). The recognition of such limitations in corpus-based evidence has motivated researchers to use more controlled elicitation tests that directly assess the use of particular collocation formats. The most frequent tests of productive knowledge are translation tasks (González Fernández and Schmitt, 2015) and gap-filling tasks (e.g., Gitsaki 1999; Bonk, 2001). However, little is known of the effect of these different formats on the assessment of collocation knowledge, as no attempts have been made to compare the relative efficiency of each test format in measuring L2 collocation production. Nevertheless, some

test formats have clear limitations. For example, the cloze tests in Bonk (2001) and Gitsaki (1999) required learners to supply only one part of the verb + noun collocations while the other element of the collocation was included in the prompt context. This could be seen to limit the validity of the test, as testing either constituent word rather than the collocation as a whole, treats collocation as a property of single words. However, more recently a collocation has been viewed as a construct of its own (e.g., Revier, 2014; Schmitt and Schmitt, 2020) which is stored, accessed and retrieved for accurate production from the mental lexicon as a whole unit, not by assembling its word parts on the basis of knowledge of semantic and grammatical rules. Thus, to assess collocations accurately, knowledge of the whole collocation needs to be tested, by means, for example, of the use of gap-filling tests that require learners to supply the whole collocation to fit the written or spoken context.

In this thesis, productive collocational competence is assessed using an adapted version of the CONTRIX test developed by Revier (2014). Not only does this test aim to assess production of collocations as integral units, but it was also the only existing productive test that had been subjected to extensive validation. During a series of validation cycles, Revier developed a set of short context or prompt sentences that were suitable for all learners at different proficiency levels. The test contains 45 gapped sentences to be filled with suitable whole collocations, which learners supply by combining a verb, article/zero article and noun from a three-column matrix to the right of the sentence prompt, as shown in Figure 3.1.

Even as a child, John decided to _____. As an adult, he really likes being able to read about his thoughts and other things that happened to him in his childhood.	push	a/an	secret
	keep	the	Idea
	pull	_	Diary

Figure 3.1: An example test item used in CONTRIX. Adapted from Revier, (2014, p.89)

Revier makes the case that this test taps into productive knowledge even though it employs a multiple-choice format that is often linked to perceptive tests. He argues that it requires learners not only to compose the meaning by piecing together the component words of the collocation and recalling the correct form of the collocation but also to make a grammatical decision concerning the right determination of the noun part of the collocation. Thus, the method attempts to test knowledge of the whole collocation in contrast to the traditional gap-filling tests that only test knowledge of one part of a collocation, given another.

3.3.2 Perceptive knowledge

A number of researchers have held that both perceptive and productive knowledge should be considered when assessing L2 collocation knowledge (e.g., Wray, 2009; Antle, 2018). This is both because perception of collocations is presumably a prerequisite for their successful production and because understanding the nuances of collocations contributes to overall comprehension of the L2. Attempts to develop standardized tests of perceptive collocational competence include DISCO (Eyckmans, 2009), COLLEX and COLLMATCH (Gyllstad, 2007, 2009). All three tests target the perceptive knowledge of verb-noun collocations and have shown high levels of reliability and validity, but each has its own strengths and weaknesses. One strength that they share is the inclusion of distractors, which not only test learners' ability to recognize non-target-like combinations but are also a way to counter their inclination to blind guess and over-estimate their knowledge (a weakness that is often linked to traditional perceptive tests employing multiple-choice formats). DISCO consists of 50 questions, each of which requires learners to choose two real collocations from three options (the third option is a non-target-like combination used as a distractor). It is

superior to the other two tests as it is computer-based[6] and does not allow test takers to make fewer or more than the required two choices from three, thus preventing data loss through learners failing to follow the instructions and choosing either only one or all three options. On the other hand, DISCO was only validated on a small group of learners (*N*=25), casting some doubts on the reported high validity of the test. COLLEX also consists of 50 questions and requires learners to identify two real collocations from three combinations. On the plus side, it was administered to a much larger group of learners (*N*= 269), but because it is paper based, nothing constrains learners to choose exactly two options. Furthermore, it could also be argued that COLLEX does not target knowledge of collocations as constructions in their own right but rather tests the depth of knowledge of individual words. This is because, in this test, the three juxtaposed options always contain combinations with a single noun (e.g., *tell a prayer*, *say a prayer* and *speak a prayer*), whereas all the collocation items in the other two tests use different nouns. Finally, COLLMATCH is a paper-based test that was validated on the same large group of learners as COLLEX. Unlike the other two tests, it contains 100 test items and uses a Yes/No format for participants to indicate whether or not each item is considered a target-like collocation. In the present study, the option of using a computer-based test was not available. I therefore employed an adapted version of COLLMATCH to assess perception of collocations because, like CONTRIX, this test elicits knowledge of the collocation as a holistic unit.

3.4 Factors affecting the acquisition of L2 collocations

In light of the commonly found evidence that the acquisition of collocations poses serious challenges for L2 learners, and given the significance of collocations in supporting target-like language proficiency, many researchers have probed the factors that could impact

[6] By contrast, in paper-based tests, learners might mistakenly select all options offered in a way that makes it hard to know their preferred answer.

the acquisition of L2 collocations either positively or negatively. One important issue is the effect of instruction on collocation learning, and this will be discussed in Chapter 4. Other relevant factors include frequency of exposure to collocations, L1-L2 congruency, and properties of the target collocations including restricted combinability and semantic transparency. Studies focusing on these factors will be discussed in the following subsections, with a particular focus on those studies that have addressed the role of semantic transparency in the acquisition of L2 collocations, which is the focus of this thesis.

3.4.1 L1-L2 congruency

L1 transfer is the most commonly researched factor in L2 collocation acquisition, as documented by many studies in the field (e.g., Biskup, 1992; Bahns and Eldaw, 1993; Phoocharoensil, 2011; Yamashita and Jiang, 2010; Wolter and Gyllstad, 2013; Wolter and Yamashita, 2015, 2017). These studies have often demonstrated positive transfer in the sense that congruent collocations (collocations that have a word-by-word translational equivalent in a learner's L1) are more readily acquired by L2 learners than incongruent ones (collocations that exist only in the L2 and do not have an L1 translational equivalent). On the other hand, negative transfer also occurs and L1 transfer has been found to be one of the main causes of L2 learners' non-target-like collocation production in several corpus-based studies (e.g., Laufer and Waldman, 2011; Fan, 2009).

L1 influence has been reported in collocation production studies that rely on L2 learners' translations (e.g., Biskup, 1992; Bahns and Eldaw, 1993) or written essay tasks (e.g., Phoocharoensil, 2011) as their primary source of evidence. One often cited study is that of Biskup (1992), which investigated the performance of 28 German and 34 Polish advanced EFL students in a translation task. The analysis revealed a strong effect of L1 on the learners' production; they successfully produced L2 collocations with L1 equivalents, while many of the non-target-like translations were attributed to negative L1 transfer. For example, instead

of the target collocation *to set a record*, the Polish learners tended to use *to state a record*, which is a word-for-word translation of an L1 collocational pattern. Likewise, the German learners were found to produce the L1-based form *to lend a bookshop* instead of the target-like version *to run a bookshop* (examples from Biskup, 1992). L1 was also documented as a major source of learners' non-target-like collocation production in an essay writing task, not only for low proficiency learners but even for highly proficient learners, by Phoocharoensil (2011). Combinations such as **I domesticate fishes* and **We play internet* were attributed to L1 transfer, as these word combinations correspond to acceptable word choices in Thai, which was the L1 of the participants. This suggests that, in production, L2 learners tend to rely on word-by-word translation from L1 rather than retrieving whole collocations in L2.

It might be expected that, with the exception of the most semantically opaque types, comprehension of collocations would pose little difficulty for learners; provided they know the constituent words, they can figure out the meaning of a collocation even if they haven't seen it before. Indeed, several researchers have compared production and perception of L2 collocations and concluded that, at a conscious level, learners struggle with their production much more than their recognition (Brashi 2009; Gaballa and Alkhayri 2014; and Eyckmans 2009; Zhang and Chen 2006). However, there have been a number of studies investigating the effects of congruency on the recognition of collocations at a less conscious level, in terms of the speed and accuracy with which L2 collocations are processed. By studying reaction times in tasks such as lexical decision or acceptability judgement, it has been shown that congruent L2 collocations are processed faster and more accurately than those without a word-for-word translation equivalent in the learner's L1 (e.g., Yamashita and Jiang, 2010; Wolter and Gyllstad, 2011, 2013). Furthermore, although there have been suggestions that this advantage may exist only in the earlier stages of L2 acquisition (e.g., Yamashita and Jiang, 2010), the majority of recent studies show that the effect persists even for advanced

learners (Wolter and Gyllstad, 2011, 2013; Wolter and Yamashita 2017). Nevertheless, the exact mechanism by which congruency exerts a processing advantage for collocations remains unclear.

One possible explanation for the processing advantage of congruent collocations is based on the model of lexical acquisition of Kroll and Stewart (1994) and Jiang (2000). According to this model, in at least the initial stages of L2 lexical acquisition, there is no direct connection between L2 forms and conceptual representations. Rather, processing the L2 word requires the learner first to access an L1 equivalent, which will already have a connection to a relevant concept. Extending this model to collocations, Wolter and Gyllstad (2011, 2013) hypothesise that when a learner acquires a new L2 word, they associate it with all information about an equivalent word in their L1, including its collocates. Exposure to the L2 word would then activate those collocates and presumably their translation equivalents, which would therefore be recognised more quickly than non-congruent collocates. However, evidence against a mediating role for L1 comes from studies that have included L1-only collocations amongst their items. If exposure to a word in L2 does indeed activate the collocates of its L1 translation equivalent, then one would expect learners to react more quickly to word combinations that collocate in L1 relative to word combinations that collocate in neither L1 nor L2. For instance, Wolter and Yamashita (2015) compared the processing of English translations of Japanese collocations that do not occur in English (e.g., *far eye*, *buy anger*), with English collocations that do not occur in Japanese (e.g., *low speed*, *catch breath*) and word combinations that collocate in neither language. They found no significant difference in processing speed between the different types, hence no support for the hypothesis that activation of L1 during the processing task would be reflected in faster processing of collocations that exist in L1 but not necessarily in L2. Wolter and Yamashita (2017) confirmed this finding in a study that also included L1-L2 congruent collocations: a positive

processing effect was clearly seen for congruent compared to incongruent collocations but not for the L1-only types. This led Wolter and his colleagues to conclude that the L1 congruency effect is more complex than the simple assumption of activating L1 lexical networks or transferring the corresponding L1 lexis during the processing of L2 collocations.

An alternative explanation for the observed processing advantage of congruent over incongruent collocations pertains to the well-established Age of Acquisition (AoA) effect, whereby words that are learned earlier are processed more efficiently than words learned later (Carroll and White, 1973). The assumption underlying this explanation is that congruent collocations benefit from positive transfer from L1 since they have the advantage of being connected to already existing equivalent L1 concepts which facilitate their earlier learning. The idea is that, on first exposure to L2, the learner has access to all collocational information from L1; as experience of L2 increases, congruent collocations are reinforced while L1 only collocations receive no reinforcement so that their links to L2 are gradually weakened (Wolter and Yamashita, 2015, 2017). This hypothesis is capable of explaining the results of the studies on L2 collocational processing described above, although, as pointed out by Wolter and Yamashita (2017), it does not explain why some L1 only collocations become fossilized in L2. There is also a possible confound between congruency and semantic transparency. The involvement of semantic transparency in the impact of L1-L2 congruency was underlined by Yamashita (2018), whose analysis of past studies revealed that most congruent collocations can be classified as transparent, whereas incongruent collocations can be categorized as opaque. Although Yamashita concluded that both congruency and transparency do exert effects on the acquisition of L2 collocations, it is clear that any attempt to understand the role of either variable needs to control for the effects of the other. This is particularly salient for the present study, whose focus is semantic transparency; it will be

necessary to ensure that any apparent effect of differences in transparency cannot be attributed to covarying differences in congruency.

A limitation of most previous studies that have investigated L1-L2 congruency pertains to the way the congruency status of their items was established. In fact, determining whether or not a given collocation is congruent is not always straightforward because collocations can often be translated in several different ways. To establish congruency status, one needs expertise in L1-L2 translation and certainly the perceived judgment of more than one proficient translator to yield a reliable congruency classification. However, most studies either did not clearly state how the concept of congruency was operationalized or relied exclusively on the researcher's own judgement. One of the few exceptions is Revier (2014), who determined the congruency status of his targeted items using bilingual dictionaries; collocations with two constituent words were categorized as congruent if the contextually appropriate translation of each constituent word appeared as the first option listed for that headword in the bilingual dictionary. However, this method of determining congruency status can be criticized for focussing on the component words and overlooking the congruency of the whole collocation (as a collocation may convey a meaning beyond the simple added-up meaning of the constituent words). The present study will attempt to improve on previous studies by using the judgements of multiple certified translators to establish the congruency status of collocations as integral units.

3.4.2 Frequency of exposure

It is well established that frequent words, i.e., those to which a learner is more frequently exposed, are likely to be learned before less frequent ones (Ellis, 2002). A growing body of research has tested whether frequency of exposure could also play a crucial role in the acquisition of L2 collocations. The frequency of collocations in these studies has usually been derived from their counts in large corpora such as the COCA (Corpus of Contemporary

American English) and BNC (British National Corpus). Researchers have generally demonstrated that corpus frequency correlates strongly with L2 learners' knowledge of collocations, and particularly L2 collocational processing. For example, Wolter and Gyllstad (2013) provided evidence for accelerated processing of collocations of higher frequency compared to less frequent ones, based on the performance of advanced learners on an acceptability judgement task. Similarly, using both eye-tracking during a reading task and an offline acceptability judgment task, Sonbul (2015) found that both L2 learners and native speakers were sensitive to the raw corpus frequency of 30 targeted collocations. However, this study did not control for the length and frequency of the constituent words in the collocations. Evidence that the frequency of the individual words might be more important than the frequency of the collocation was reported by Nguyen and Webb (2016), who found that the frequency of the component words of collocations has a strong effect on receptive knowledge. In fact, the frequency of the individual words appeared to be the strongest predictor among other tested factors, viz, the mutual information score, part of speech, L1-L2 congruency and collocation frequency.

In contrast to the above-mentioned studies, other researchers have failed to find a strong effect of frequency on L2 collocational knowledge. For instance, in his meta-analysis of 19 collocational studies, Durrant (2014) found only a moderate link between collocation frequency and knowledge. In addition, González Fernández and Schmitt (2015) found that learners had a substantial productive knowledge of L2 collocations that was only moderately related to corpus frequency. However, the analysis of a background questionnaire about the learners' use and amount of engagement with the English language outside the classroom revealed a strong effect of frequent exposure to L2 input, which was even stronger than the number of years of English study. Similarly, Macis and Schmitt (2017a) confirmed such findings, but with respect to perceptive collocational knowledge, measured by a meaning

recall test. While collocation knowledge did not correlate at all with the corpus frequency of the targeted collocations, the amount of engagement with English outside the classroom, in particular in relation to reading, the year of study at university and time spent in an English-speaking country appeared to be positively related to L2 collocation acquisition. The absence of a frequency effect can be explained by the fact that corpus frequency might not be a good representative of the frequency of input that learners actually receive, especially in the EFL context where input may be largely determined by teachers and materials writers.

A further shortcoming of previous works on the role of frequency on collocation acquisition pertains to their failure to control for learners' prior knowledge. One of the few studies that attempted to avoid such a weakness is Durrant and Schmitt (2010), in which learners' knowledge of collocations was pretested and only unknown collocations were used to examine the effect of the frequency of exposure on their acquisition. The results indicated that even a single exposure can lead to a small but effective recall of previously unknown collocations; two repeated exposures were found to have a significant facilitative impact on L2 collocation learning. This suggests that any shortfall in learners' collocational knowledge is mainly due to inadequate exposure to L2 input. However, even though this study was innovative in examining the acquisition of newly encountered collocations, it can also be criticized for only controlling for previous knowledge of the collocations and not their component words. Thus, it is plausible that learners' previous knowledge of the words that made up the collocations impacted their performance. In the present study, this shortcoming will be addressed by pretesting participants' knowledge not only of collocations but also of their constituent words.

3.4.3 Restricted collocability

One of the challenges facing an L2 learner is to develop an awareness of the extent to which the constituents of the word combinations they encounter can be substituted by other

words. Researchers interested in this issue have carried out corpus-based studies that rely either on the combinatory information in corpus-based dictionaries or computational measures of association to establish the degree of restriction of a collocation. The most common finding is that strongly-restricted collocations are more difficult for L2 learners to produce than less restricted ones. Two such studies are Durrant and Schmitt (2009)[7] and Granger and Bestgen (2014),[8] both of which analyzed collocations extracted from learner corpora in terms of their association scores in a large reference corpus of native-speaker English. The measures used were the t-score, which tends to highlight highly frequent word combinations (e.g., *hard work* or *good example*); and Mutual Information, which emphasizes less frequent but strongly associated word combinations (e.g., *immortal souls* or *tectonic plates*) (examples from Durrant and Schmitt, 2009, p.167). The analyses revealed that, in comparison to native speakers, L2 learners made extensive use of high-frequency collocations and under-used strongly-associated but low frequency collocations. These latter types of collocationally-restricted combinations were found to be an important defining marker differentiating between native and L2 speakers (Durrant and Schmitt, 2009), and between intermediate and advanced learners (Granger and Bestgen, 2014). However, the types of collocations that were difficult to master, i.e. those with high MI scores, also tend to be infrequent collocations and to consist of infrequent component words. Therefore, there is a high probability that these collocations were absent from learners' collocation production because these learners had not yet been exposed to these infrequent collocations. In other words, it is more likely that, when researchers found evidence of an under-use of collocations

[7] This study is unique in considering a learner corpus as a series of individual texts rather than a long text. This new approach accounts for the variability between different L2 learners, which was not understood in previous learner corpus studies.

[8] As distinct from from Durrant and Schmitt (2009), who relied on learner corpora that were not stratified for proficiency level, Granger and Bestgen (2014) compared learner corpora with two proficiency levels, advanced and intermediate, against a reference native corpus. Their analysis was extended from modifier + noun combinations, which were the focus of Durrant and Schmitt, to a full range of bigrams. Unlike Durrant and Schmitt, the learners' collocations were also extracted automatically.

with high MI-score, they were not assessing learners' knowledge of collocations that are highly restricted in the collocabilty of their words, but rather their lexical knowledge of infrequent words.

In contrast to the studies discussed in the previous paragraph, Nesselhauf (2003)[9] found that learnability of L2 collocations was not directly correlated with low degree of substitutability. She investigated the production of verb + noun collocations with different degrees of restrictedness in the essay writing of advanced German learners of English. The strength of restriction was determined on the basis of the combinatory information offered for each word in two corpus-based dictionaries. Collocations were categorised into a more restricted group in which the verb was found to combine with "a very limited number of nouns" (e.g., *pay attention*, *run a risk*) and a less restricted group in which the verb combines with "a larger number of nouns but where some arbitrary restriction nevertheless holds" (e.g., *perform an experiment*) (p.199). Both types were found to be more problematic to learners than free combinations (e.g., *read a book*). However, the learners' production was least target-like in cases where the target collocation belonged to the less restricted group. It was hypothesized that the more flexible a collocation in the combinability of its elements, the less readily noticeable it is and therefore the less easily acquired by L2 learners. However, Nesselhauf did not control for the relative semantic transparency of her collocations, and it is therefore possible that this affected her results.

In summary, the above reported impact of the degree of collocability on the acquisition of L2 collocations should be interpreted with caution. The role of this factor can be more reliably explored only by considering the possible effect of the semantic properties of collocations as well as learners' prior knowledge of the constituent words in L2 collocational

[9] One of the earliest studies that took into consideration the combinability property in the study of L2 collocations.

development. Moreover, a fuller picture with respect to the influence of the degree of collocability can only be achieved when its impact is examined not only on production but also on perceptive collocational knowledge, an area that has not yet been fully explored.

3.4.4 Semantic transparency

One factor that has so far been under-researched in L2 collocation acquisition is the relative semantic transparency of collocations. Since there is considerable research on idioms that suggests that their reduced semantic transparency renders them relatively challenging for L2 learners (e.g., Martinez and Murphy, 2011), it is possible that this might also apply to collocations. Studies that used a statistically based approach in their identification of collocations have tended to overlook their semantic characteristics. Even though the significance of the semantic quality of collocations has always been recognized by linguists in the field (e.g., Grant and Bauer, 2004; Howarth, 1998), it is only recently that researchers have started empirically examining the effect of this factor on L2 collocation learning. As far as I have been able to ascertain, only four previous studies have looked directly into the impact of semantic transparency on L2 collocational acquisition (Huang, 2001; Revier, 2014; Macis and Schmitt, 2017a; Gyllstad and Wolter, 2016). These studies are reviewed in the following sections, which highlight the gaps still to be addressed.

Huang (2001) is the earliest attempt to explore the impact of semantic transparency on L2 collocational competence. He studied four categories of lexical collocations which represented varying gradations of semantic transparency based on the classification system of Howarth (1998). These four categories were:

(i) free combinations (e.g. *blow a trumpet*) – transparent meanings of all constituent parts;

(ii) restricted collocations (e.g., *blow a fuse*) –one constituent has a specialized sense while the other is literal in meaning;

(iii) figurative idioms (e.g., *blow your own trumpet*) –the whole word combination has a metaphorical meaning which can be derived from its literal interpretation;

(iv) pure idioms (e.g., *blow the gaff*) – a more opaque, unitary meaning which cannot be derived from the meaning of its constituents.

Huang's hypothesis was that collocations with lower degrees of semantic transparency would be more difficult for L2 learners to acquire. To test this hypothesis, knowledge of these four semantically different types of collocations by thirty Chinese EFL learners was investigated by means of a gap-filling test. Although the test results provided support for his prediction, since more semantically opaque items were less well learnt, the findings are undermined by limitations in the study design. Firstly, the gap-filling test only required learners to supply one word of the collocation, which meant that it was only measuring learners' partial knowledge of the collocation, as the other component word was provided as part of the prompt sentence. Secondly, categorization of the semantic transparency of the collocations relied on the researcher's own intuition. Finally, the study did not tightly control for potential covariates such as the frequency of the test items and learners' prior familiarity with them.

Another study that aimed to examine the influence of semantic transparency on the production of L2 collocations is Revier (2014). As discussed in Section 3.2.1, Revier carried out a total of five studies in his quest to develop a valid test (CONTRIX) of the productive knowledge of whole collocations. These studies aimed to profile the knowledge of verb + nouns collocations by Danish learners of EFL at different levels of formal education (10^{th}- and 11^{th}-graders, 12^{th}-graders and university students). In three of the studies, one of the main objectives was to explore the extent to which collocation production is supported by semantic transparency. The semantic transparency of 45 targeted collocations was determined first on the author's own intuition and second on whether or not the relevant senses of the component

words were listed as the first meaning for each word in a learner dictionary; it was assumed that the first-listed sense is the literal, i.e. transparent, sense. Accordingly, Revier classified his items into three semantic categories: transparent; semi-transparent; and non-transparent collocations. The findings in general revealed that learners' ability to produce collocations increased as the semantic transparency level of the collocations increased. However the exact pattern of the results changed across proficiency levels. At lower levels of proficiency, learners' collocational knowledge was characterized by a binary pattern, in which a significant difference was found between transparent collocations on the one hand and both semi-transparent and non-transparent collocations on the other. In contrast, at the highest level of proficiency, knowledge of semi-transparent collocations patterned with the transparent type and was significantly different from non-transparent collocations. However, as Revier himself conceded, his method for measuring semantic transparency left room for improvement. Accordingly, he suggested refining the approach used to establish the semantic transparency of collocations in future research, in order to more clearly tease out the role of semantic transparency in their acquisition.

The only existing study to have looked at the effect of semantic transparency on the processing of L2 collocations is, to the best of my knowledge, Gyllstad and Wolter (2016). They examined the processing of verb + noun word combinations that were either partially transparent (classified as collocations) or fully transparent (classified as free combinations). The main aim of this study was to test the hypothesis (based on Howarth's 1998 categorization of word combinations) that collocations are psychologically real in L2 learners' mental lexicons and are processed differently from free word combinations as a result of their lower degree of semantic transparency. To this end, the accuracy and speed of response of 27 advanced Swedish learners of English in an acceptability judgement task was compared to that of 38 native speakers. The semantic transparency status of the combinations

was classified by two raters in addition to the researchers, and the items' frequencies were obtained from COCA. The findings gave support to Howarth's model, as collocations were processed more slowly and with a higher error rate than free word combinations. However, no difference was found between native and non-natives in their processing performance, leading the researchers to doubt the claim that native speakers process lexical items holistically while non-natives process them word by word (Wray 2000). Comparing the effects of semantic transparency and frequency, it was found that the former appears more to affect the accuracy of response while the latter appears to influence the speed of response. However, a serious deficit in this study, recognized by the researchers themselves, is their failure to take into account the participants' prior familiarity with the tested items, which weakens the reliability of the observed evidence regarding the effect of semantic transparency on L2 collocation processing.

Like Gyllstad and Wolter (2016), Macis and Schmitt (2017a) studied the effects of semantic transparency and frequency on receptive knowledge of L2 collocations. This study looked at the learning of collocations such as *queen bee* that have both figurative and literal interpretations. The participants were 107 Spanish university students of EFL at different educational levels (first to fourth year). The targeted collocations in this study were verb + noun and adjective + noun collocations, which were extracted from multiple sources including dictionaries, the internet, radio and TV. The frequency of both literal and figurative meanings of each item were determined through corpus analysis, using COCA as a reference corpus. The degree of semantic transparency of the items was determined by the ratings of 18 Spanish speakers from different countries of origin (Chile, Mexico and Spain) on a scale from 1 to 4. The main test employed was a receptive meaning recall test in which the targeted collocations were embedded in sentences, underlined and written in bold. Learners' perceptive knowledge was tested by their ability to write the accurate meaning of the tested

collocations either in L1 or L2. A questionnaire was also included in the test to collect information about the students' degree of L2 engagement. Generally, the results of the mixed-effect modelling revealed that figurative collocations were difficult to acquire (the overall collocational knowledge of learners only reached 33% of the total 100%). However, against the researchers' expectation, neither semantic transparency nor corpus frequency appeared to have a significant effect on knowledge of the targeted collocations. Only the amount of education, time spent in an English-speaking country and reading were positively correlated with the knowledge of figurative collocations (see Section 3.4.2 for an interpretation of why a corpus frequency did not show a significant effect here). A possible explanation for the lack of semantic transparency effect pertains to the measurement method of semantic transparency since the transparency ratings were performed by non-native speakers. As shown by Boers and Webb (2015), non-native speakers differ in their sensitivity to the degrees of semantic transparency of idioms compared to native speakers. Moreover, variation in their judgments of semantic transparency was also reported, leading the researchers to suggest the use of a much larger norming sample to even out this variability and yield more reliable findings (p.13). A further limiting aspect in this study is related to the fact that the language proficiency level of learners was not controlled for, which might have affected the reliability of the outcome.

Despite their methodological limitations, semantic transparency was found in almost all the aforementioned studies to play a role in the development of L2 collocational knowledge. However, all these studies had some weakness in the method by which the degree of semantic transparency was established. Furthermore, none of the studies controlled for all the other factors known to influence the acquisition of L2 collocations, including L1-L2 congruency, frequency of exposure, and prior knowledge of the collocation or its constituents. It is therefore only by means of a more tightly controlled study that the question of whether or not

relative semantic transparency *per se* promotes L2 collocation knowledge, can be more satisfactorily and confidently answered. This gap will be filled by the current study. Firstly, it will develop a robust method for estimating the semantic transparency of collocations. Secondly, it will test the effect of transparency thus measured on the learnability of L2 collocations, while controlling for congruency, frequency and prior knowledge. Finally, it will address this question for a group of learners with a low proficiency level, in contrast to previous studies which have tended to focus on more advanced learners.

3.5 Summary

In light of the studies reviewed above, a number of important findings and research gaps can be highlighted. In general, gaining collocational competence is not an easy task for L2 learners, and even highly proficient learners rarely attain target-like production. Nevertheless, the acquisition of collocations is essential for most L2 learners as they enhance fluency and communicative competence in a way that significantly correlates with measures of linguistic proficiency. Among the factors that have been suggested to influence the acquisition of collocations are L1-L2 congruency, frequency of exposure, the degree of restriction of their component words and semantic transparency. However, a careful review of the literature has shown that only four studies have sought empirical evidence for the potential effect of semantic transparency on L2 collocation acquisition (Huang, 2001; Revier, 2009; Macis and Schmitt, 2017a; and Gyllstad and Wolter, 2016). Furthermore, each of these studies have methodological limitations, and none of them were classroom-based or targeted low proficiency learners. Moreover, many of the data-collection instruments employed in collocational studies have not been extensively validated. Recently, however, work has been carried out to develop more standardized tests of L2 collocational knowledge, e.g., COLLEX and COLLMATCH (Gyllstad 2007) and CONTRIX (Revier 2014). As asserted by Henrikson (2013 p. 45), the use of such standardised tests may facilitate comparison of the results of

different studies and hence enhance understanding of the relative effects of different factors on the collocational acquisition.

Overall, the substantial attention that L2 collocation research has received in the last 30 years has resulted in fruitful findings. However, the picture that has emerged is not entirely clear. Some of the questions that have not been adequately answered relate to the possible role of semantic transparency on L2 collocation learnability. Research gaps with respect to a lack of control for prior knowledge of the component words of collocations and limited investigations with regard to the collocational acquisition of low proficiency learners call for more research in this area.

4 Teaching L2 Collocations

4.1 Introduction

The central role played by collocations in helping learners achieve fluency in a second language[10] has been well documented in L2 research. It is also often acknowledged that the acquisition of collocations poses serious problems for most L2 learners and that L2 collocations are often not successfully acquired. One of the several reasons that has been put forth to account for learners' difficulty in acquiring L2 collocations pertains to the traditional approach of language instruction that focuses on individual words and ignores multiword expressions such as collocations. EFL classrooms in particular suffered for a long time from the neglect of collocation-focused instruction, as pointed out by a number of researchers (Farghal and Obiedat, 1995; Fan, 2009; Chan and Liou, 2005). However, influenced by Lewis's (2000) call to optimize the lexical approach to language learning in L2 classrooms and his recommendations to L2 teachers about how to facilitate the acquisition of collocations, the last two decades have witnessed a surge in intervention studies aiming to explore the best teaching methods or educational tools that could potentially promote learners' acquisition of L2 collocations. This chapter reviews these studies in the context of literature on the teaching of L2 vocabulary generally. Section 4.2 briefly discusses methods for teaching vocabulary in general that can also be applied to L2 collocations. This is followed by two sections, Sections 4.3 and 4.4, that review the findings of pedagogical intervention studies focused specifically on L2 collocations. Section 4.3 mainly focuses on studies that examine the usefulness of implicit learning tasks, while Section 4.4 is devoted to

[10] For many speakers, this means native-like fluency, but there is a debate about whether this is or should be the case (see Chapter 3).

studies that investigate the effectiveness of explicit tasks in promoting L2 collocation learning.

4.2 Teaching L2 vocabulary: the state of the art

4.2.1 Effective learning conditions

As there are as yet no available clear guidelines specifically developed for the teaching of L2 collocations, some of the guidelines that have been suggested for the teaching of single words have been proposed as applicable to the teaching of multiword combinations including collocations. This trend is reflected in Nation's (2001) claim that "chunks can be most effectively memorized by following the same learning guidelines as for isolated words" (p.343).

One of the main theories about the conditions necessary for successful L2 vocabulary learning pertains to four psychological learning conditions, namely *noticing*, *retrieval*, *varied encounters or use*, and *elaboration* (Webb and Nation, 2017, p.61). These learning conditions can be incorporated into L2 classroom activities for the fruitful teaching of any vocabulary item, including multiword combinations such as collocations. Repetition, i.e., the number of encounters, and the quality of attention in each encounter, are two factors central to this framework of learning, as illustrated in Table 4.1 below. The stronger the degree of directed attention to a lexical item, whether incidental or deliberate (the distinction between these two modes of learning is discussed below), and the more frequent the encounters with this item, the better it is thought to be learned. In support of this theory, several researchers have shown that both attention quality and repetition of input are key determiners of L2 vocabulary learning, while a few have provided evidence suggesting that the quality of the encounters has a stronger effect than their quantity (e.g., Laufer and Rozovski-Roitblat, 2015; Webb, 2008). For example, in Laufer and Rozovski-Roitblat (2015), it was found that reading with word-focused activities that required elaboration, attention and involvement was more

effective in word retention than reading with an increased number of encounters to these target words. Such word-focused activities include, for example, gap-filling, matching, and translation from L2 to L1 or vice-versa.

In Webb and Nation's (2017) framework, the first prerequisite for vocabulary learning to occur is *noticing*. This involves activities that direct learners' attention toward a lexical item and make them aware of its usefulness; for example, noticing an unknown word incidentally while listening or reading, or noticing it intentionally when looking it up in a dictionary. The next level, *retrieval*, can be achieved by offering learners multiple opportunities to retrieve previously taught or encountered lexical items. For incidental learning, this might mean seeing a previously encountered word while listening or reading; for deliberate/intentional learning, it might mean explicitly recalling the meaning of the previously seen word. The next cumulative level, *varied encounter* and/or *varied use*, involves an encounter with a lexical item that is different (*varied*) from its previous *retrieval.* For example, in perceptive learning, a word is met again in an extensive reading task but in a different context or a true or false exercise. Productive learning of this condition might involve recalling and using a previously encountered word in a new way in conversation (perceptive attention) or doing a different exercise like a cloze task (productive attention). The fourth level, *elaboration*, involves some enrichment of the previously met words, which could incidentally occur when knowledge of a word is enriched by a memorable picture during reading or deliberately during a word part analysis that is intended to lead to elaboration of knowledge. These four levels of learning conditions are cumulative but do not necessarily occur in the same ranked order as shown in Table 4.1 (The grey highlighted cells show examples of activities targeting the perceptive level, while the non-highlighted cells show examples of those targeting the productive level).

Table 4.1: Conditions for vocabulary learning.

Quality of attention	Incidental	Deliberate
1. Noticing	Guessing from context	Highlighting words in a text
	Noticing a gap when speaking or writing	Focusing on the form or meaning of a word on a flashcard
2. Retrieval	Seeing a previously encountered word while listening or reading, and recalling its meaning	Remembering words on flashcards
	Recalling and using a recently encountered word as part of conversation or writing	Recalling a list of words
3. Varied encounters (receptive) or varied use (productive)	Seeing a previously encountered word in a new form or context while listening or reading, and recalling its meaning (e.g., linked skills)	Looking at different examples of the word used in context
	Recalling and using a recently encountered word in a new way in conversation or writing (e.g., linked skills)	Doing topic-based continuous writing
4. Elaboration (receptive or productive)	Encountering a word in a memorable communicative situation	Creating a chart or map of related words (semantic mapping)
	Describing pictures	Analyzing word parts

Source: adapted from Webb & Nation (2017) (p. 63)

Although these learning conditions are currently applied to a greater or lesser extent in most L2 classrooms, only a few researchers have empirically examined their effectiveness in teaching L2 vocabulary.[11] Liou and Chen (2018) is one of the few instructional studies to show that these psychological conditions are effective in promoting the learning of academic formulaic sequences by EFL college students. Furthermore, it is worth noting that a variety of other factors are also important. These include factors related to word properties, such as L1-L2 congruency, meaning and syntactic complexity, as well as learner-related factors, such as motivation and proficiency level, which can all affect the learning burden for a particular

[11] Most researchers refer to these learning conditions by the older classification made by Nation (2001, 2013) in which *varied encounters/use* is replaced by *generation/creative use*, while *elaboration* is not included. The difference is basically a matter of terminology, and although the *elaboration* condition is not mentioned, the role of knowledge enrichment is emphasized by researchers adopting the early classification (e.g., Hatami, 2015).

lexical item in a given context. Nevertheless, the higher the learning burden of a lexical item, the more it presumably requires efficient learning conditions such as repetition and increased quality of attention to be effectively learned. Overall, it is generally accepted (e.g., Hatami, 2015) that providing learners with multiple opportunities to encounter, notice, retrieve and efficiently engage in enriching vocabulary learning activities are effective practices for fruitful vocabulary learning. In the present study, an effort will therefore be made to integrate these learning conditions into the materials design and teaching methods for the pedagogical intervention described in Chapter 6.

4.2.2 Effective teaching modes of L2 vocabulary

It is generally recognized that there are two modes of learning L2 vocabulary, whether single words or word combinations, which underpin L2 teaching approaches. These two modes have been labeled differently by different researchers: “deliberate” and “incidental”; “direct” and “indirect”; “intentional” and “unintentional”; “meaning-focused” and “form-focused”; “explicit” and “implicit”, reflecting the various ways in which the two modes are thought to differ. Generally, incidental/ implicit vocabulary learning occurs “as a by-product of language usage, without the intended purpose of learning a particular linguistic feature” (Schmitt, 2010, p.29), whereas in deliberate/explicit learning the focus is intentional, with the specific goal of learning a word or phrase (Schmitt and Schmitt, 2020, p.138). The basic difference between these two modes is sometimes said to be the absence/presence of deliberate attention, which is problematic because it is debatable whether one can rule out that a learner might have some degree of intention within implicit learning. For example, when learners come across an unknown word in written or spoken input, their focus might be shifted from understanding the overall message of an input in typical implicit learning to trying to infer the meaning of this particular word. Moreover, it is recognized that learners engage with an input with different intentions (such as obtaining specific information,

understanding the message of text or learning some linguistic features, whether grammatical or lexical), and the main intention for some learners is to learn any unfamiliar word or phrase which they encounter in any L2 input. In L2 classrooms, it could be argued that, with easy access to a dictionary, a learner might be more inclined to use it to look up the meaning of new words (instead of just to support comprehension of input), which implies some degree of deliberate attention to learn these words. In addition, the typographical enhancement of new words in reading texts might encourage learners to intentionally focus on learning these words rather than understand the meaning of the text as part of ideal incidental learning. Thus, from a pedagogical perspective, rather than defining learning by the degree of intention, incidental learning can be defined as a by-product of meaning-focused tasks. This is because it is the purpose of the activity rather than the degree of intention involved in the task that carries the most weight in classroom-based learning. Along the same lines, explicit learning can be said to result from activities whose purpose is mainly to develop awareness of a form, such as matching, sentence generation or flash cards. Thus, *meaning-focused learning* and *form-focused learning* have been suggested as alternative terms to *intentional* and *accidental* learning, which avoids the problematic issues of intention and attention (Webb, 2019). However, in this thesis, rather than proliferating terminology, I will use the more established expressions ‘explicit learning’ and ‘implicit learning’, while recognizing that the two types of learning are most likely to arise from form-focused and meaning-focused activities respectively.

Numerous studies have shown that implicit learning contributes significantly to L2 vocabulary acquisition. An abundant body of research has shown that learners greatly benefit from implicit learning of words through reading, which has been the main source of input in these studies (e.g., Zahar, Cobb and Spada, 2001; Pellicer-Sánchez and Schmitt, 2010; Pigada and Schmitt, 2006; Webb and Chang, 2015a). Implicit learning of lexical items through

listening has also been demonstrated by many studies, but with smaller learning gains than for reading (e.g., van Zeeland and Schmitt, 2013; Vidal, 2011). Some evidence suggests that, in implicit learning conditions, combining oral and written modes of input, such as reading while listening, can lead to superior learning gains of words (e.g., Webb and Chang, 2015b), compared to reading only (Webb and Chang, 2012) or listening only (e.g., Brown, Waring and Donkaewbua, 2008). More recently, the use of audiovisual media, such as watching television or captioned video, has been shown to lead to small but very useful implicit learning of words (e.g., Montero Perez, Peters and Desmet, 2018; Peters and Webb, 2018), and to be more beneficial than reading-only conditions (e.g., Neuman and Koskinen, 1992).

Though beneficial, implicit vocabulary learning has been shown to be relatively less effective than explicit learning in L2 classrooms. Implicit learning of lexical items is mainly encouraged by increasing their frequency in the encountered input (see Webb, Yanagisawa and Uchihara, 2019). Some research (e.g., Waring and Takaki, 2003; Webb, 2007) suggests that eight to ten encounters could lead to implicit knowledge of words, but in fact there is no established threshold that guarantees successful learning. This is because other factors such as background knowledge or the complexity of a word's meaning may affect vocabulary knowledge. A disadvantage of implicit learning is that it is incremental, requiring multiple encounters and large amounts of time, which is difficult for L2 learners who have limited time, especially in the constrained time of L2 classrooms. Moreover, knowledge gained through implicit learning is more likely to be perceptive than productive, as learners might be able to recognize the form and understand the meaning of an unknown word in written and spoken input but not be able to produce this word (Schmitt and Zimmerman, 2002). In contrast, in explicit learning, word knowledge gains are attainable at both perceptive and productive levels (e.g., Elgort, 2011; Pellicer-Sánchez, 2015). Overall, there is compelling evidence supported by several studies that compare the relative effectiveness of both implicit

and explicit learning that the latter could lead to more learning gains (e.g., Schmitt, 2008; Sonbul and Schmitt, 2010; Elgort, 2011; Hennebry et al., 2017). However, it is widely recognized that learners need to know a large number of words (around 6,000–7,000 word families for oral communication and 8,000–9,000 word families for good written communication in English) (Nation, 2006), which is challenging to explicitly cover in L2 classrooms. Therefore, it has been suggested that implicit and explicit learning be viewed as complementors rather than competitors (see Webb and Nation, 2017; Webb, 2019; Schmitt and Schmitt, 2020).

More recently, researchers have begun to see the value of an integrated/combined approach which usefully combines complementary principles from both explicit and implicit learning, but more research is needed to validate the best way to implement this approach. Sonbul and Schmitt (2010) is an exemplary study supporting this integrated approach, in which the authors found that implicit reading plus explicit instruction was more effective than implicit reading only for Saudi learners of English. Similarly, the use of a combined approach joining incidental reading with an explicit task (a word list to aid in verifying meaning) was shown by Mondria (2003) to lead to good learning gains comparable to those obtained by explicit learning only (translation given before a memorization task) for Dutch learners of French. Other studies have advanced this integrated approach as, in addition to providing evidence supporting its fruitfulness, they have shown that the type and time sequence of the explicit task accompanying the main implicit learning activity in L2 classrooms, i.e., before, during or after it, is also significant. For example, Alamri and Rodgers (2018) revealed that explicit teaching with visual aids dialogue for Saudi learners of English *before* the main implicit reading/listening activity was more beneficial than three other learning conditions that differed in the time and type of the supporting explicit tasks employed (viz, post-teaching with visual-aided dialogues, pre-teaching with written-only dialogues and post-teaching with

written-only dialogues). In contrast, Malmir and Yosouf (2019) found that during implicit reading was the optimal time for explicit teaching of the target words (through definitions, synonyms and antonyms), followed by explicit pre-teaching, which was better than explicit post-teaching. The findings of this study, however, might be limited by the small number of participants (*N*=20) in the groups allocated to each of the three learning conditions. Clearly, further research is required to establish the optimal type and time sequence of explicit/implicit activities in L2 classrooms, as the current findings are inconclusive.

Overall, pedagogical intervention studies on single words have clearly highlighted the benefits of implicit learning practices for L2 learners, especially those that combine two modes of input, such as written and audio, and definitely when audiovisual media input is used. However, when compared to the explicit mode of teaching/learning, learning gains resulting from implicit learning are less significant than those of explicit learning only. Recent pedagogical research indicates that combining both approaches is an effective way of teaching L2 vocabulary, particularly when explicit activities using visual aids, are implemented before or during implicit activities in the L2 classroom. The following sections discuss the relevance of implicit and explicit approaches in the teaching and learning of L2 collocations.

4.3 Implicit Teaching of L2 collocations

It has often been suggested that one of the reasons why L2 learners experience difficulty in developing their collocational knowledge is that they typically receive too little input and especially too little or inadequate instruction in the use of collocations (e.g., Li and Schmitt, 2009, p.86). To explore this claim, a growing body of pedagogical studies has been conducted during the past two decades that has attempted to investigate the impact of different interventions on supporting L2 collocation acquisition. These studies have included both implicit and explicit approaches to the teaching and learning of vocabulary, as discussed

in Section 4.2.2 above. However, despite this rise in interest, research into collocational instruction is still in its infancy, and the few available studies have only given a glimpse of initiative guidelines for L2 collocational teaching and learning. The following sections briefly review the main findings of these studies.

There is a widely acknowledged claim in the literature that learning collocations implicitly is difficult because learners may fail to notice them, due to the fact that the individual component words are relatively more frequent than the collocations (e.g., Nesselhauf, 2005; Webb, Newton and Chang, 2013; Webb, 2019). In other words, the claim is that collocational patterning does not attract L2 learners' attention, especially for relatively infrequent collocations that consist of frequent words. This was illustrated in a study by Hoang and Boers (2016), who found that learners are more inclined to notice single words rather than their phraseological patterning. They performed an experiment where learners were asked to re-narrate a story which they had read and listened to twice. In their retelling of the story, learners were found to recycle/reproduce very few of the multiword expressions from the original text, even though they reproduced single words from the original story, many of which appeared as part of multiword combinations in the text. These findings suggested that the implicit approach is not an optimal mode for learning L2 collocations, and that collocations are more likely to need more explicitly focused instruction.

Several researchers have suggested that an increased number of collocation encounters in L2 input is a central factor necessary for their successful implicit learning. For example, the role of repeated exposure in the learning of collocations incidentally, through reading comprehension texts, was investigated by both Webb, Newton and Chang (2013) and Pellicer-Sánchez (2017). In the former study, four groups of learners were presented with different versions of a graded reader accompanied by an audio reading, that differed in the number of times each of 15 verb + noun collocations appeared (viz, one, five, 10 and 15).

The researchers reported that the group that encountered the collocations 15 times significantly outperformed the other groups both in perceptive and productive post-tests of form and meaning, while 10 encounters also led to significantly better performance than five and one encounters in three of the four post-tests. Accordingly, they concluded that repetition had a significant effect on the incidental learning of the form and meaning of collocations (p.109). However, they also acknowledged that their findings should be interpreted with caution due to the fact that they did not conduct pretests to measure prior knowledge of the items making up the collocations (as considerable learning gains were observed for the control group that were attributed to the pretest learning effect). Furthermore, it can be argued that seeding a text with multiple repetitions of each targeted collocation is not easy for materials writers to accomplish and does not reflect authentic language use (Webb, 2019, p.148).

In an attempt to overcome the limitation of past studies that did not adequately control for previous knowledge of collocations prior to treatment, Pellicer-Sánchez (2017) tested implicit learning of made-up/unreal collocations. He examined the effect of repeated encounters (four and eight repetitions) of six created collocations (made up of an adjective + pseudoword to control for prior knowledge) included in a reading text. These results did not show any significant effect of repetition in the incidental learning of collocations from reading. However, as the targeted words were neither real collocations nor ecologically valid,12 it is questionable whether these findings might be generalized to real L2 collocation learning. Nonetheless, Macis (2018) replicated Pellicer-Sánchez's finding, as he also did not find any significant effect of repeated encounters on incidental learning—in this case, of duplex collocations (i.e., those which can be both literal and figurative, e.g., hit the road)—

[12] "Ecological validity examines whether the results of a study can be generalized to real-life settings" (Andrade, 2018, p.499).

and suggested the involvement of other variables in relation to L2 collocation acquisition. In this study, three PhD students with different L1s were presented with a list of 38 contextualized target words and given four weeks to read a novel in which the target collocations were found. The results of one-to-one interviews on meaning-recall of collocations (testing only those that were unknown to each participant in the pretest) did not provide support for a frequency effect on collocation learning, leading Macis to conclude that the successful acquisition of collocations, particularly those with figurative meaning, depends not only on the number of encounters in L2 input, but also on various other factors (p.60). Furthermore, it is quite possible that the overall learning outcomes may have been influenced by the learners' prior knowledge of the words making up the collocations, especially as these learners were at an advanced level of language proficiency, and this in turn is a shortfall undermining the findings of this study.

To increase the potential for learning collocations implicitly through reading, researchers have looked at the benefits of typographical enchantment in promoting their learnability. As defined by Kim (2006), input enhancements are "pedagogical techniques designed to draw L2 learners' attention to formal features in the L2 input" (p.345), such as underlining or bold or colored typing. The positive effect of input highlighting with bold font on learning collocations from reading was shown by Choi (2017), who found greater learning gains (in an immediate recall test and a week-delayed post-test) by a group of learners after they read a text with enhanced collocations compared to a control group (reading the same text unenhanced). These positive outcomes of bold typing of collocations were confirmed with the results from eye tracking (recorded for learners during their reading). However, the study also revealed (particularly from the findings of the eye tracking) impaired recall of words that were unenhanced, perhaps because learners gave unenhanced items inadequate

attention as a trade-off for the attention that was drawn to the enhanced words. This suggests that for typographical enhancement to be effective it should be implemented in moderation.

Questioning Choi's (2017) unexpected finding regarding the negative impact of enhancing collocations on other unenhanced collocations in the same input, Boers et al. (2017) argued for the opposite position, claiming that enhancing collocations through underlining could positively promote the learning of other unenhanced collocations in the same input. The authors expected that enhancing some collocations' saliency by underlining them in an input would make learners more aware of the collocating pattering of the words and consequently notice all other instances of collocations in the same input which are not similarly enhanced, i.e., underlined. To test this hypothesis, they compared collocation learning under three reading conditions: in one condition the targeted collocations were enhanced by underlining; in the second condition only half the targeted collocations were enhanced, which were expected to stimulate the recognition of other unenhanced collocations included in the same reading text; in the third condition, none of the collocations were enhanced. The findings showed that enhancing collocations promoted their successful recognition, but, against the authors' expectation, the positive effect of enhancement did not extend to other unenhanced collocations.

When the impact of typographical enhancement of collocations by colored and bold typing has been compared to the effects of increasing their frequency in the input, the former appears to be more influential in accelerating collocation learning. This was clearly shown by Sonbul and Schmitt (2013), who compared the effectiveness of both typographical enhancement and increased frequency (which they termed enrichment) in supporting the implicit learning of English collocations by Saudi undergraduates. Both implicit conditions involved the reading of contextualized collocations in a passage which was enriched (via an increased frequency of encounter with five targeted collocations) in one condition and

enhanced in the other (the five collocations appeared in red bold font). These two types of exposure were also compared to a traditional explicit learning condition in which collocations were decontextualized (each of the five targeted collocations was flashed three times for 10 seconds in red font on different PowerPoint slides). All three conditions were shown to promote both explicit knowledge of collocations (measured by two traditional explicit tests, cloze and multiple-choice, that targeted form-recall and form-recognition respectively) and implicit knowledge (measured by an implicit automatic priming task). However, textual enhancement of collocations was found to bring greater learning gains than more frequent encounters. Nevertheless, it is important to mention that all the assessment tools employed in this study measured knowledge of only one part of the targeted collocations, i.e., their partial knowledge, because both collocation tests required knowledge of only the verb part, while the priming task presented the verb to the learners to prime for knowledge of only the collocating noun. As mentioned in Chapter 3, tests that measure knowledge of the whole collocation are more informative and offer a more valid assessment of collocation knowledge that those that elicit only partial knowledge of collocations.

Similar to bold and coloured text, typographical enhancement by means of underlining also seems to be more effective in supporting collocation learning than increasing the frequency of encounters, as demonstrated by Szudarski and Carter (2016). In this study, the reading of six stories (within seven weeks) in which a number of verb + noun and adjective + noun collocations were underlined was shown to lead to significant learning gains in comparison to reading the same stories with no enhancement. These learning gains were revealed in both the production and comprehension of collocations. However, the gains were only significant in three of the five tests employed in the study, specifically in the three gap-filling tests that required learners to supply one word of the collocation, but not in the two tasks that required translation of the whole collocation, either L2 to L1 or L1 to L2. The

researchers hypothesised that underlining may have led participants to notice the collocations and remember their form, but not to process them deeply enough to learn their meaning. They suggest that explicit meaning-focussed teaching activities, in addition to enhanced text, may be needed to help learners develop productive knowledge of collocations. On the other hand, they suggest that in cases where only receptive knowledge is required, repetition alone might be sufficient.

4.4 Explicit Teaching of L2 collocations

The impact of frequent encounters with collocations on accelerating their acquisition has been examined not only in the context of implicit learning but also in studies employing explicit approaches. These studies were motivated by Lewis's (2000) call to raise L2 learners' conscious awareness of collocations by means of increasing the exposure to them in explicit learning conditions, and also by the observation that increasing the frequency of encounter with collocations alone in implicit learning conditions seems to be less effective than attention-drawing techniques such as textual enhancements. One such study is Peters (2014), who found that increasing the number of exposures to L2 collocations in explicit learning activities led to significant learning gains. She presented two groups of learners with a list of L2 targeted collocations with their definitions in addition to eight fill-in gap and definition-matching exercises, in which each targeted collocation was included once, three, or five times. The two groups differed only in the time of administration of unannounced post-tests (the first group took an immediate and a one-week delayed posttest, while the second group received one-week and two- week delayed posttests) which required learners to supply a collocation by translating its definition from L1 to L2. In both groups, the results revealed that increased frequency of encounter during explicit collocation instruction had fostered

collocation production (a significant difference between all three occurrences, one, three, and five, was discovered).[13]

Different groups of pedagogical interventions have indicated the usefulness of different types of tasks or classroom practices in supporting explicit learning of collocations. For example, Webb and Kagimoto (2009) compared the outcomes of two conditions on the learning of verb + noun collocations (reading three sentences with glossed collocations vs. completing three gapped sentences accompanied by glossed collocations), whose findings revealed that glossing (i.e., the provision of a corresponding L1 translation) significantly supported both productive and perceptive learning of collocations. The supportive role of glossing in the learning of collocations was also confirmed in a more recent study by Webb and Kagimoto (2011) which indicated that presenting collocations with glossed sentences facilitates their productive learning.

The importance of incorporating explicit tasks which involve the contrastive comparison between learners' L1 and L2 collocations in the teaching of collocations has been emphasized by Laufer and Girsai (2008). In their evaluation of three instructional conditions after the completion of a reading task with the targeted verb + noun collocations, the authors found that form-focused tasks that involved two translation tasks (from L1 to L2 or vice-versa) with teacher feedback on L1-L2 differences were the most beneficial in promoting collocation learning. The second type of form-focused tasks (including a multiple-choice and gap-filling task) was only significant compared to the third instructional condition or the meaning-focused task (a text comprehension task with group or pair discussion). This study, however, suffered from the problematic issue shared by some other intervention studies, namely the use of the same test for both pretesting and post-testing stages, as it is highly possible that

[13] However, as the learners were pretested four weeks prior to the intervention, it is likely that they might have learnt some of the targeted items during the time interval before intervention, which in turn might have impacted their performance in the post-tests.

learners' performance in the second administration of the test after intervention may have been influenced by their practice on the same test during its earlier administration.

There is some evidence that learning tasks that elicit the whole collocation are more effective than those in which the component words are disassembled and learners have to either supply only one part of the collocation or connect the component parts to form a collocation. The findings in both Boers et al. (2014) and the replication study by Boers, Dang, and Strong (2017) provide support for the beneficial effect of whole-collocation-focused task formats in enhancing collocation learning. In the first study, the evaluation of four different formats of exercises, common in ESL textbooks and teaching materials, in the learning of verb + noun collocations did not reveal substantial learning gains as a result of any of the exercise formats in the productive post-test. However, poor learning outcomes were more often observed in exercise formats that required reassembling of the component words of the collocations (viz, 'Connect', 'Insert the verb' and 'Underline the verb') than in formats that required supplying the collocation as a whole intact phrase ('Insert the collocation'). Motivated by these observations, Boers, Dang, and Strong's (2017) replication study found support for the positive effect of formats that generated the whole collocation (i.e., gapped sentences to be filled with intact collocations from the list provided), but not for formats that entailed reassembling the component parts of the collocations (i.e., gapped sentences with a missing verb to be filled in with a verb from a list provided, as well as gapped sentences with missing verbs with no list, but with the first letter provided as a cue). This replication study overcame some of the methodological design flaws in Boers et al. (2014a), such as the use of the pretest as also a post-test, which has the potential to impact subsequent learning either negatively or positively. As a method to control for prior knowledge, Boers, Dang, and Strong (2017) pretested a group of learners who were claimed to be comparable to the test groups and used their scores as a benchmark. However, this

method fails to take into consideration individual differences between learners in the treatment groups and the control group with respect to the level of their prior vocabulary knowledge. In other words, the performance of the comparable group in the pretest could not really reflect the extent to which the treatment group were familiar with the targeted collocations. Thus, further pedagogical interventions testing the effectiveness of task formats that encourage learners to produce the whole collocational structure and avoiding the methodological shortcomings of previous studies would be of great value.

Verb + noun collocations are the most commonly investigated type of collocations in previous pedagogical studies assessing the value of specific tasks on their learnability (e.g., Webb and Kagimoto, 2009; Laufer and Girsai, 2008); this is probably because this particular type of collocation has often been reported as very difficult for learners to acquire (e.g., Nesselhauf 2005; Laufer and Waldman, 2011; Nguyen and Webb, 2016). One technique that has been recently proposed by Tsai (2020) to enhance the learning of verb + noun collocations is the use of concept-based tasks that focus on elaborating the semantic meaning of the verb (i.e., explaining the core meaning of the verb with image schemas) and the visual conceptualization of the whole verb + noun collocation (i.e., asking students to draw the collocation event). To test the relative effectiveness of these tasks, Tsai compared them to traditional explicit learning practices (through underlining and gap-filling activities) in teaching collocations with either *make*, *do*, *take* or *get* as the first component. Her findings showed that concept-based practices led to more sizable learning gains than the traditional explicit approach in terms of form recall, form-recognition and meaning-recall. This suggests that practices that evoke a deeper understanding of the meaning of collocations can facilitate the learning of verb + noun collocations. Although insightful, these findings are limited by the small number of tested targeted collocations (only 12 collocations). More importantly, it is unknown whether the use of concept-based activities could be equally effective in teaching

other types of verb + noun collocations (viz, collocations which do not include delexical verbs) with varying degrees of semantic transparency.

Similar to the finding for single words, the use of an integrated approach involving both explicit and implicit activities has been shown to be more effective for the learning of collocations compared to the implicitly oriented teaching approach alone. A clear example is Szudarski's (2012) study, which provided strong evidence to support the usefulness of an integrated approach, incorporating specific explicit exercises in addition to implicit activities, in promoting the learning of verb + noun collocations, as opposed to exclusively relying on an implicit approach. In this study, two treatment groups were instructed to read three texts, one per week (each text included ten targeted collocations repeated twice) and to complete comprehension questions. The implicit-learning approach group had an additional comprehension-based activity, whereas the integrated-learning approach group completed one type of more explicitly based activity each week (viz, a cloze task, reading list of collocations and their definitions, matching activity and multiple-choice task). Comparison of their post-test outcomes revealed a significant improvement in collocation learning for the integrated approach group; in contrast, no learning improvements were observed for the implicit approach group. The effectiveness of more explicitly oriented activities in promoting the acquisition of L2 collocations was further supported by other intervention studies such as Sonbul and Schmitt (2013), which compared learning of both implicit and explicit conditions, and Laufer and Girsai (2008), who mainly employed a combined approach but compared, within this approach, learning conditions that were more or less intensively focussed on explicit activities.

These previous studies provided empirical support for the common claim in the field that one of the reasons why learners have problems with collocations is due to the teaching practices implemented in most ESL classrooms, especially in an EFL context which highly

stresses “input-based” or implicit learning and tends to refrain from explicitly focused teaching of collocations (Laufer and Waldman, 2011, p.285). The recent findings of El-Dakhs, Amroun and Charlot-Muhammad (2018), which recapitulate those of previous studies, are a clear example of how implementing a more explicitly focused approach, with the use of varying modes of input, viz, spoken and written, is the most effective method for the teaching of collocations in an EFL context. The authors show that the approach is more effective than a more implicitly focused approach, even when the latter involves more extensive exposure to collocations. In this study, the learning gains of verb + noun collocations by two experimental groups[14] were compared. One group received more intensive explicit teaching in which they read and listened to a dialogue once (with six embedded collocations) and received explicit instruction by the teacher on the provided L1 definitions, in addition to completing a sentence-generating task for the six targeted collocations. The other group received more intensive implicit teaching in which they were provided with four opportunities to read and listen to the same dialogue with the same six collocations but were offered only one explicit activity at the end of the session. More significant learning gains were found for the more explicitly oriented learning condition, suggesting its superiority over the approach that relied more on implicit activities even though it included more exposure opportunities. Accordingly, the authors concluded that teaching collocations with intensively focused explicit activities is the most useful approach, particularly in an EFL context such as Saudi Arabia (the context of this study) that has a relative lack of opportunities for exposure to English input.

There are a number of elements in El-Dakhs, Amroun and Charlot-Muhammad (2018) that add to its value and at the same time shed light on some of the gaps in previous

[14] They compared the productive, form recall (with gap-filling test) and perceptive, form-recognition learning (with multiple choice test) of 24 verb-noun collocations of two experimental groups and a control group. Both experimental groups received four sessions, in each of which they were exposed to six target collocations embedded in spoken and written dialogue followed by two collocation tests.

pedagogical studies on collocations. Almost all relevant pedagogical intervention studies have relied exclusively on written input, in which context El-Dakhs, Amroun and Charlot-Muhammad (2018) is one of the few exceptions. Although Webb, Newton and Chang (2013) also used both spoken and written input, this was only in the context of implicit learning rather than both implicit and explicit learning. According to Webb (2019), "listening input may be helpful because the availability of prosodic cues can make it easier to discern MWIs [multiword expressions]" (p.147). Nevertheless, in real-time listening, it might be difficult for some learners to catch the composition of a collocation. To compensate for this disadvantage, the provision of written along with audio input can help learners see collocations at the time of hearing them. However, in contrast to pedagogical studies on single words, no study has yet, to my knowledge, compared the effects of different types of input modes or assessed the relative usefulness of audio-visual media in the learning of L2 collocations. Moreover, El-Dakhs, Amroun and Charlot-Muhammad (2018) is one of only two previous pedagogical intervention studies to have investigated the explicit collocation learning of Arabic learners of English in the context of Saudi Arabia[15] (the context of the present study). The other is Sonbul and Schmitt (2013), who focused on typographical enhancement. Furthermore, the learners in El-Dakhs, Amroun and Charlot-Muhammad (2018) were low-proficiency learners, whose learning of collocations has rarely been the subject of scrutiny in past pedagogical intervention studies. As learners with different proficiency levels and from varying backgrounds might acquire L2 collocations differently, it is essential to explore the development of learners at a variety of levels and from a variety of backgrounds to obtain a clearer picture of L2 collocation acquisition.

[15] All participants spoke Arabic as L1 but were from different Arabic countries, and their different cultural backgrounds could be considered a confounding variable.

It is noteworthy that a major weakness in the pedagogical studies conducted so far comes from not strictly controlling for prior knowledge of the tested collocations. For example, Sonbul and Schmitt (2013) acknowledged that the results of their study might be methodologically limited as the effect of learners' prior knowledge was not controlled for before the intervention. Moreover, some of the few studies that attempted to control for prior familiarity with the tested collocations did not employ rigorous methods. For example, Pellicer-Sánchez (2017) used partially pseudo-collocations which are not ecologically valid, whereas Peters (2014) used the same test as both a measure of prior knowledge as well as a post-test of treatment impact, ignoring the possibility that the pretest might have a residual learning impact on participants' performance in the post-tests. Similar to El-Dakhs, Amroun and Charlot-Muhammad (2018),[16] Marci (2018) assessed only the familiarity of the collocations as a whole and did not pretest knowledge of the individual words that made up the collocations, though she recognized that knowledge of the words making up collocations could potentially influence learners' overall learning gains (p. 63). Therefore, the findings of these pedagogical studies need to be interpreted with caution, taking into account this methodological limitation.

4.5 Summary

As discussed in Chapter 3, learning L2 collocations is not an easy task and requires considerable effort from L2 learners. Studies on the acquisition of single words suggest that they can be learnt implicitly, through activities that focus on the overall message of a text, provided such activities offer repeated and varied opportunities for learners to notice and retrieve the words in question. In contrast, studies that focus on implicit learning of collocations have shown that learners may fail to notice collocations, especially when they

[16] The testing of learners' previous familiarity with the target collocations was determined by the subjective assessment of some instructors who rated the learners' previous familiarity of the target collocations on the Likert scale. The authors admit that this method is subjective and not as reliable as quantitative methods.

are composed of familiar words. There is, however, some evidence that textual enhancement in the form of bold type or underlining can lead to better implicit learning of collocations, with superior learning gains compared to increased frequency of exposure. Nevertheless, the advantages of typographical enhancement do not extend to other nearby unenhanced collocations and might negatively take attention away from other neighboring lexical items in the same input.

Both in the learning of single words and, even more so, in the learning of collocations, activities that explicitly focus on the item to be learnt have been shown to be more effective than those related to implicit learning, especially for production. Moreover, some explicit activities were found to lead to greater learning gains than others. For example, activities that integrate learners' L1 such as glossing and translations, and tasks that promote knowledge of collocations as intact constructions, especially those that focus on their meaning, were more effective learning tools than activities that require reassembling the parts of collocations. Explicit learning is especially important in EFL contexts, where there are limited opportunities for exposure to L2 input. Nevertheless, because explicit teaching is time consuming, a combined approach that integrates both implicit and explicit activities and employs different input types, audio and visual, may be the most promising method for teaching L2 collocations.

It is important to note that the findings from the above reviewed pedagogical studies need to be treated with caution due to a number of methodological limitations, especially related to inadequate control for learners' previous familiarity with the collocations and/or their constituent words. Moreover, none of the available pedagogical studies has explored the relative difficulty/ease of learning collocations with various degrees of semantic transparency. In addition, the collocational learning of low proficiency learners in general and those from a Saudi background in particular has also been an under-researched topic, not only

in pedagogical collocation research but in collocation research generally. Overall, reviews of the pedagogical intervention studies conducted so far (see, in addition to the review in this chapter, Boers and Lindstromberg, 2012; Szudarski, 2017; Supasiraprapa, 2018) have not uncovered any clear systematic guidelines as to the most effective instructional methods to foster knowledge of L2 collocations. As pointed out by Sonder (2019) "[i]nstructed L2 collocation learning is thus an area ripe for investigation" (p.2), in which context the present study represents an important and much needed contribution to the literature.

5 Semantic Transparency of Selected Collocations

5.1 Introduction

The literature reviewed in the previous chapters has revealed that the role of semantic transparency in the acquisition of L2 collocations has not yet received the attention it merits. Most collocational studies have either focused only on transparent collocations or have shied away from exploring semantic transparency as a possible factor that may impact the learnability of L2 collocations. Therefore, the question of to what extent semantic transparency affects the production and recognition of L2 collocations remains to be answered. The primary objective of this thesis is to address this question. To do so, a pedagogical intervention experiment was designed (reported in more detail in Chapter 6) in which a number of Saudi students of EFL would undertake five weeks of training sessions on a set of targeted collocations that were completely new to them. Their perceptive and productive knowledge of these collocations would then be tested.

It was essential that the targeted collocations used in the experiment were carefully selected using clearly defined criteria and controlling for possible confounding variables. Equally importantly, the selected collocational items needed to represent multiple levels of semantic transparency. That is because the effect of semantic transparency is the key factor under investigation, i.e., the independent variable in the design of the pedagogical intervention study. Thus, the main purpose of the present chapter was to answer the following question:

Is it possible to establish a hierarchy of semantic transparency for English verb + noun collocations, as defined by a combination of frequency and phraseological approaches?

The rest of the chapter begins with a justification of the methodological approach, outlining the main criteria followed in the selection of the set of collocations to be used in the pedagogical intervention experiment. Sections 5.2.2 to 5.2.4 give a more detailed account of how the set of targeted collocations was selected from a corpus, checked against a children's dictionary and controlled for L1-L2 congruency. The chapter also illustrates, in Sections 5.3 and 5.5, two attempts that were made to assess the semantic transparency of the targeted collocations. Section 5.3 describes the methodology used to collect the human ratings of semantic transparency. This is followed by Section 5.4 that reports the results and analysis of these ratings. Section 5.5 gives details of a second method used to measure the semantic transparency of items, viz, the distributional-based semantic measure. The results and the analysis of this method are reported in Section 5.6. Finally, Section 5.7 includes a discussion of the main findings.

5.2 Selecting Collocations

5.2.1 Overall objectives

As described in Chapter 2, in line with a number of other recent studies, this thesis takes a view of collocation that aims to combine insights from both phraseological and frequency-based traditions. On this view, collocations are not defined as having a certain level of semantic transparency but are regarded as a set of multiword expressions with varying levels of transparency along a continuum from fully transparent to fully opaque. The thesis tests the hypothesis that variation in the semantic transparency of collocations affects their learnability by L2 students. According to Wray (2002), L2 learners, unlike L1 speakers, usually segment and look at the elements of a collocation separately, and consequently

collocations are often interpreted literally word by word (e.g., Martinez and Murphy, 2011). Such word-by-word interpretation can give rise to difficulties in understanding and using more opaque expressions, as is well attested by idiom studies (e.g., Liao and Fukuya, 2004) and by some of the few studies that have investigated processing (e.g., Gyllstad and Wolter, 2016) and perceptive knowledge (e.g., Macis and Schmitt, 2017a) of less semantically transparent L2 collocations. I therefore hypothesise that more transparent collocations are likely to be learned more effectively and easily than less transparent ones.

In order to test the prediction that more transparent collocations will be learned more easily than less transparent ones, it is necessary first to establish a reliable method for measuring the relative transparency of collocations. Secondly, it is necessary to select a sample of collocations that vary in transparency but in which transparency is not confounded with other variables known to affect learnability, including congruency and prior knowledge of the constituents. As discussed in Chapter 3, four previous studies have investigated the relationship between the acquisition of L2 collocations and their level of semantic transparency, namely Huang (2001), Revier (2014), Macis and Schmitt (2017a) and Gyllstad and Walter (2016). Of these, all except the last found some evidence that more semantically opaque items were less well learnt than more transparent ones. However, all four studies had some weakness in the method by which the degree of semantic transparency was established, involving the use of the researchers' intuition and classifying transparency as a categorical rather than continuous variable. Furthermore, none of the four studies controlled for all the other factors known to influence the acquisition of L2 collocations, namely L1-L2 congruency, frequency of exposure, and prior knowledge of the collocation or its constituents. Finally, none of these studies involved a pedagogical intervention, and in fact no study has previously explored the relative difficulty/ease of learning collocations with

varying degrees of semantic transparency in a teaching context. The present thesis fills these gaps.

The first aim of the study reported in this chapter is to examine the feasibility of establishing the rankings of semantic transparency, on a continuous scale, for a set of collocations selected by a method that combines both frequency-based and phraseological approaches. Secondly, since it has been suggested that more transparent collocations are more likely than more opaque ones to have translation equivalents across languages (Yamashita 2018), the chapter aims to select a sample of English collocations in which degree of transparency is independent of congruency with Arabic. The gap that cannot be fully addressed in the present chapter is the need to control for learners' prior knowledge of experimental items; this will be dealt with in Chapter 6, when describing how participants were selected for the intervention study. Nevertheless, in selecting the collocations, the frequency of their constituents will be used to estimate the probability of their being known by the participants, whose general proficiency level in English is known in advance.

The collocation sample that was selected for inclusion in this study was based primarily on the frequency-based approach with the incorporation of some phraseological approach-related criteria, such as grammatical well-formedness (described in Chapter 2) in the later phase of the sampling process. As argued in Chapter 2, complementing the frequency-based approach with the phraseological approach in an integrated approach that encompasses the key characteristics of collocations commonly accepted by most researchers in the field is considered a fruitful method for the identification of collocations. The definition of collocations used in this study is adapted from Gyllstad (2009), who views collocations as:

> two syntagmatically related and frequently co-occurring orthographic words, either adjacent or separated by a specified distance [...] where the meaning evoked by the

> combination as a whole, sometimes requiring additional lexical elements for grammatical well-formedness and usage convention […] varies in its degree of opaqueness. (p.155)

Based on this definition, and taking into account their potential suitability for the objective of this thesis, only collocations that met the following criteria were considered as candidate items (a more detailed rationale and account of the selection process is presented in Sections 5.2.2, 5.2.3 and 5.2.4):

1. To address the phraseological dimension of collocation, the candidate word combinations should consist of two lexical items in a direct syntactic relation with one another, more specifically a verb + noun combination, in which the noun is part of the complement of the verb. This follows Seretan (2011) and Church and Hanks (1990), who view syntactic dependency relations as a defining characteristic of collocations. Restricting the selection to only one type of collocation was seen as necessary as it has been observed by researchers that different types of collocations are acquired differently in terms of the rate of learning (e.g., Gitsaki, 1999; Barfield, 2007). It was decided to focus on verb + noun collocations because the verb + noun collocation is a commonly researched structure which is often reported as difficult for L2 learners to acquire (e.g., Nesselhauf 2005; Laufer and Waldman, 2011; Nguyen and Webb, 2016). Furthermore, since verb + noun collocations are amongst the most frequently researched type of collocations in the literature (Henriksen, 2013), and were the focus of the previous studies on semantic transparency in collocations, investigating this particular type would enable comparisons of the results of this study with previous research. In particular, should the present study fail to replicate previous findings that transparency influences learnability, it will be reasonable to attribute this difference to having more tightly controlled predictors in the present study, since the target collocation type will be constant across studies.

2. The two lexical parts of the collocation should either occur in a corpus as adjacent items, or with a determiner intervening between them where grammatically required. This is to avoid introducing additional variables into the study that might affect learnability, namely the potential impact on learnability of longer collocation constructions or those with component parts further apart from each other. As shown in previous studies such as Tiv et al. (2019) and Herbay, Gonnerman and Baum (2018), adjacent multiword units are processed faster by L2 learners than split ones.

3. Both component words in the combination should be within the range of 2,000–4,000 in a ranked frequency list of English words. This range was chosen to decrease the probability that participants in the intervention study would already be familiar with the collocations or their constituent words. Based on their proficiency level, the participants in this study are expected to have vocabularies of about 2,000 words and therefore limited knowledge of words above a word frequency rank of 2,000. According to Krashen's input hypothesis (1991), the most appropriate linguistic input for learning to take place is one step beyond a learner's current linguistic competence. A range of 2,000–4,000 in the frequency-ranked word list is expected to be one level beyond the targeted learners' current word knowledge and therefore to represent an appropriate level of input.

4. To address the frequency-based dimension of collocation, the candidate word combinations should have a Mutual Information (MI) score greater than three. This threshold has often been used to identify collocations in the frequency tradition, i.e., as word combinations that occur together more often than would be expected by chance (e.g., Church and Hanks, 1990; Hunston, 2002). (See Chapter 2 for more detail on MI.)

5. The raw frequency of the combination should be more than 10 occurrences in the Corpus of Contemporary American English. A lower cut-off point of 10 was chosen because

very low frequencies can distort mutual information scores (Evert and Krenn, 2001; Dunning, 1993; Kilgarriff, 2005). For example, two items that occur only once in a corpus would have a high mutual information score if they happen to occur adjacent to one another by chance.

6. In the set of collocations chosen for the intervention experiment, both constituent words in the combination have to be unique in the sense that each lexical word occurs only once in the final selected collocation list. This was to ensure that none of the collocations would be learned better than the others simply because the learners received more exposure to their component words (as they were part of other collocations in the final set of items).

7. The selected experimental items had to be relatively suitable for the age range of the student participants in the research (eighth-grade students aged between 14 and 15). This was accomplished by including only experimental items whose component words were listed in a children dictionary (see Section 5.2.3 for more detail).

8. The word pairs should instantiate a range of different levels of semantic transparency (see Sections 5.3 and 5.5 for more detail). This is obviously essential, since the intervention study aims to test the effect of transparency, operationalized a as a continuous variable, on learnability.

9. The combinations should be congruent; that is, they should have equivalent translations in the learners' L1, to control for L1 transfer (see Section 5.2.4 for more detail). This approach was taken to differentiate potential effects of transparency from the well-established effect of congruency on learnability. If all the collocations used in the study are congruent, then any effect that emerges for semantic transparency cannot be attributed to differences in congruency.

5.2.2 The Corpus of Contemporary American English

The selection of the targeted collocations involved incorporating certain criteria, mentioned above, in the process of their retrieval from a corpus. It also included checking the

suitability of the candidate collocations and ascertaining control of possible influencing variables by estimating their congruency status with a designed task and using a beginner learners' dictionary as reference. The selection process was carried out in several phases in order to obtain the best possible candidates for inclusion in the main intervention and later in the testing stage. In the first phase, 400 verbs that were in a frequency rank range of 2,000–4,000 words were randomly selected from a list of the top 5,000 words[17] in the Corpus of Contemporary of American English (COCA) (Davies, 2008). Besides the fact that COCA, a corpus of 560 million words, is considered "the largest genre-balanced corpus of English," this particular corpus was chosen because American English is the most commonly used variety of English in Saudi Arabia, which is the setting intended for the main data collection of this study.

The second phase was the extraction of the noun collocates from COCA for each verb from the list of the 400 randomly selected verbs. This was automatically undertaken by setting the search in the show "Collocate" function of the search panel to look for all forms of each verb (_v*) from the list and all its co-occurring nouns (_nn*'). The window size was set two places to the right, and the "Sort" parameter was changed to "Relevance" with a minimum frequency of 10 occurrences of the collocation to eliminate low frequency once-off combinations. Under the "Options" parameter, the number of results or "HITS" was set to show 10,004 hits and to be "GROUPED BY" "none" to show the part of speech for the words, and the "DISPLAY" was set to show both the raw frequency and occurrences per million words. Furthermore, only the collocates with an MI greater than 3.00 were selected for inclusion (see Section 5.2.1). The same procedure was repeated for each verb in a random order, and the results for each verb were copied onto the same Excel spreadsheet. The initial

[17] This word frequency list is freely downloadable at https://www.wordfrequency.info/free.asp?s=y.

resultant list consisted of 8,897 word-combinations of multiple noun collocates for each verb, which were checked against the frequency ranked list to ensure that all nouns included, as well as the verbs, were from the frequency rank 2,000-4,000. In addition, all plural "nn2" noun collocates were removed from the list, leaving only singular "nn1" noun collocates.

Table 5.1: The final 44 collocation items and their frequency counts in COCA

No.	Collocation	FREQ	*PER MIL*	ALL	%	MI
1	accompany an exhibition	32	0.06	14604	0.22	5.08
2	accomplish an objective	51	0.09	14630	0.33	5.61
3	adapt a recipe	31	0.06	11831	0.26	5.51
4	approve a recommendation	15	0.03	5743	0.26	4.88
5	arrest the decline	14	0.03	18911	0.07	3.04
6	assess a personality	19	0.04	17347	0.11	3.36
7	assign priority	46	0.05	14737	0.21	5.02
8	assist recovery	19	0.04	19003	0.1	3.86
9	balance a load	14	0.03	12701	0.1	4.2
10	bury waste	16	0.03	28122	0.06	3.04
11	cast a reflection	12	0.02	11807	0.1	3.6
12	celebrate a wedding	59	0.1	21964	0.27	4.83
13	contact the manufacturer	42	0.08	7095	0.59	6.34
14	deserve an award	36	0.06	21728	0.16	4.4
15	detect an error	10	0.02	14131	0.07	3.49
16	dismiss a suggestion	63	0.11	8022	0.74	7.3
17	display emotion	34	0.06	9942	0.34	5.33
18	distribute electricity	21	0.04	15919	0.13	4.67
19	doubt the existence	34	0.06	21379	0.16	4.98
20	embrace diversity	64	0.11	20511	0.31	5.48
21	enable the viewer	15	0.03	5771	0.26	4.98
22	enhance someone's reputation	69	0.13	16280	0.41	5.74
23	exercise the imagination	17	0.03	12812	0.12	4.18
24	implement a treaty	22	0.04	12253	0.18	4.31
25	impose a penalty	25	0.04	12478	0.2	4.85
26	inform selection	18	0.03	19278	0.08	3.37
27	monitor pollution	19	0.03	14489	0.13	4.13
28	negotiate an arrangement	15	0.03	9349	0.16	4.68
29	occupy territory	68	0.12	16926	0.4	6.1
30	overcome a barrier	22	0.04	8289	0.27	5.54
31	permit entry	35	0.06	14050	0.23	4.97
32	plant a flag	88	0.16	14441	0.61	6.52
33	possess a talent	23	0.04	17919	0.11	4.41
34	practice a craft	33	0.06	12864	0.26	5.58
35	process a request	18	0.03	20245	0.09	3.89
36	race the clock	43	0.08	14692	0.27	5.32

37	resist infection	14	0.02	14439	0.1	3.92
38	restore trust	102	0.11	42371	0.14	4.53
39	rule the universe	14	0.03	20564	0.07	3.5
40	shape the curriculum	15	0.03	22597	0.07	3.28
41	switch channel	21	0.04	17631	0.12	4.25
42	translate a phrase	16	0.03	13748	0.11	4.24
43	vary the height	15	0.03	15715	0.1	3.67
44	yield an insight	48	0.08	9397	0.47	6.27

The final list of collocations, with their frequencies and MI scores in COCA, are shown in Table 5.1, above. The frequency-based filtering processes reduced the list of candidate collocations to 575 items. However, because a combined frequency-based and phraseological approach was being adopted to the definition of collocation, it was also necessary, in the third phase of selection, to take into account the syntactic relations of the candidate combinations. It was a pre-requisite for inclusion that the noun should head the complement of the verb. This criterion was intended both to ensure that the combination represented a collocation in phraseological terms, and to avoid having excessive structural variation that might make it more difficult to isolate any effect of semantic transparency in the results of the intervention study. Therefore, during the initial statistical retrieval of the candidates from COCA, the parameters were set to increase the probability that hits would satisfy the syntactic condition by extracting noun collocates within two places to the right of the keyword, i.e., the pre-selected verb. In doing so, it was expected that the method would retrieve noun collocates with the required syntactic relation; in this case, the head (or main) noun in a complement of the verb, i.e., the node. However, as a further way to avoid instances in which words might have been tagged incorrectly in the corpus (i.e., to avoid cases of V + N strings which did not involve a verb and a noun heading its complement), the extracted list of potential collocations was subjected to manual inspection in order to check their syntactic relation and filter out those that did not conform to this criterion during the third phase. For example, *approve + publication* was rejected because the verb in most examples (in COCA) is always followed

by the dependent preposition *for* (e.g., it has been *approved for publication*). In the combination *adjust + oven*, the noun *oven* is always found modifying another noun and was therefore also excluded (e.g., *Adjust the oven rack* to the middle position).

The fourth phase involved additional checking with respect to how frequently these candidate collocations occurred as the desired structure, i.e., a verb + noun collocation where the noun functions as the head of a complement of the verb, within the concordance lines of their search in COCA. It was decided that all experimental items need to appear at least five times as a verb + noun combination, in which the noun is the main noun in an NP complement of the verb within COCA context to be considered for inclusion in the final set. Thus, combinations that did not comply with this description were rejected. For example, the combination *monitor + enforcement* was rejected, as it was found that, in most example sentences in COCA, the noun *enforcement* did not instantiate the head (or main noun) in a complement of the verb but rather was always connected to the gerund *monitoring* with the conjunction *and* (e.g., *monitoring and enforcement*).

In some cases, further elements that were needed to complete the construction were accepted; for example, an article (e.g., people who *deserve* an *award*), a prepositional phrase following the noun (e.g., *informs the selection* of participants) or a non-finite clause following the noun (e.g., Pissarro's pictures *enable the viewer* to understand them). Because some collocations occurred with more than one kind of additional element, (e.g., *commit a crime*, *commit the crime*, *commit crimes*, *commit no crime*, *commit his crime* etc.) a decision had to be made about which form or forms would be presented to the students in the intervention study. Accordingly, the collocations were listed in the structure they most frequently appear with in COCA, i.e., including the article with which they most frequently appear, unless appearing without an article (as shown in the final set of the targeted collocations in Table 5.2). For example, the collocation *race + clock* is frequently found in

COCA to include the article *the*, and thus it would be listed and taught in the intervention phase (and later tested) as *race the clock*; this is the article with which this collocation usually appears in COCA, rather than just *race clock* or *race against the clock* (which is more commonly used in British English). This was also the structure adopted when the collocations were presented to the human raters of semantic transparency.

Table 5.2: Final set of targeted collocations with example sentences from COCA

No.	Collocation	Example Sentence from COCA
1	accompany an exhibition	The brief video profile presented to **accompany** the **exhibition**, which includes glimpses of the house, is posted on the museum's website.
2	accomplish an objective	The lectures I prepared for the Guest Lectures Program were specifically designed to do this, and I think I have **accomplished** the **objective** very well.
3	adapt a recipe	Marianne Pizzitola of Magnolia Manor Sweets in Sharpsburg says the bakery **adapted** a **recipe** to make it gluten- and allergen-free for their bakery and farmers market customers.
4	approve a recommendation	If the committee recommends to the board that the proposal become official and the board **approves** the **recommendation**, then the proposal is voted upon by the membership at the annual meeting in August.
5	arrest the decline	Notre Dame must hire at least two-thirds Catholic faculty simply to **arrest** the **decline** that ultimately puts at risk its identity as a Catholic school.
6	assess a personality	Frequently, observations of behavior and emotional stability conducted across educational, social, and work settings are used to **assess personality** and interests.
7	assign priority	Lonergan **assigns priority** to a mysticism of transforming union as the existential principle from which flow charitable service and theological reflection.
8	assist recovery	In some cases, a transfusion of plasma from a recovered victim has also **assisted recovery.**
9	balance a load	If you **balance** the **load** correctly, there will be zero weight on the handle and the cart will pull like a feather.
10	bury waste	Energy Secretary Spencer Abraham formally announced a plan yesterday to **bury** the **waste** at Yucca Mountain in Nevada.
11	cast a reflection	The polished marble of Lenin's tomb **casts** a **reflection** of death.
12	celebrate a wedding	Some of these Afghans say they were firing weapons in the air to **celebrate** a **wedding** when the air attacks began.
13	contact the manufacturer	She then **contacted** the **manufacturer** and sent samples and photographs, and within a few months a contract was signed.
14	deserve an award	The problem is not that there aren't people who **deserve** an **award**, but that people don't want to be nominated.
15	detect an error	Fifteen-year-old Justin Rosenfeld **detected** an **error** at a museum, the Museum of Science in Boston last month.

16	dismiss a suggestion	He **dismissed** the **suggestion** that there was any connection between his donations and his lobbying work.
17	display emotion	He **displayed emotion** that he usually masks so well.
18	distribute electricity	The enormous system of power lines and controls that **distributes electricity** from generating plant to your air conditioners.
19	doubt the existence	9 out of 10 Americans say they have never **doubted** the **existence** of God.
20	embrace diversity	Multicultural art education should **embrace diversity** and explore more of the differences in order to foster a deeper understanding of others.
21	enable the viewer	Pissarro's pictures **enable** the **viewer** to understand them as complete, wholly present, and, at the same time, to remain aware of their partialness.
22	enhance someone's reputation	A high-ranking skater **enhances** the **reputation** of the club.
23	exercise the imagination	Whether the existence of the world is a mysterium tremendum et fascinans or a mere tautology, it continues to **exercise** the **imagination** of philosophers and theologians.
24	implement a treaty	Eves warned that his government would refuse to **implement** the **treaty** in the absence of a federal plan.
25	impose a penalty	If you do **impose** a **penalty** later, it will just seem harsh and arbitrary.
26	inform selection	Quantitative data in the first phase **informs** the **selection** of participants for the second qualitative phase.
27	monitor pollution	Two full-time state workers who **monitor pollution** at one of its Syracuse plants.
28	negotiate an arrangement	European leaders were desperately trying to **negotiate** an **arrangement** to keep currencies stable.
29	occupy territory	The Confederates **occupied territory** just south of Washington
30	overcome a barrier	Researchers have **overcome** a **barrier** that previously prevented the study of living tissue from people at risk for early heart disease and stroke.
31	permit entry	A small section of glass has been removed, just large enough to **permit** the **entry** of hand to the window lock.
32	plant a flag	Man eventually will step onto the surface of Mars, but not merely to **plant** a **flag** and come back home.
33	possess (a) talent	I discovered I **possessed** a **talent** for public speaking.
34	practice a craft	These men weren't just managers; they actually **practiced** the **craft** of making ads.
35	process a request	The agency is trying its hardest to **process** the **request** as soon as practicable.
36	race the clock	Fernando Torres, who **raced** the **clock** to get ready for South Africa this season after two knee operations.
37	resist infection	Rosemary is known for its ability to **resist infection.**
38	restore trust	We must acknowledge those concerns, and move quickly to **restore trust** in our public health systems.
39	rule the universe	Mama Chona clung even more closely to the God she knew with absolute certainty **ruled** the **universe**.
40	shape the curriculum	The learner's perceptions should **shape** the **curriculum**.
41	switch channel	One of those gadgets that **switch** the **channel** from far away.
42	translate a phrase	He began in Asari, then **translated** the **phrase** into English.

43	vary the height	Research assistants **varied** the **height** of the piles of plywood boards that were placed against the walkway so that the drop-off depth ranged from 1 to 7 inches.
44	yield an insight	These new techniques promise to give scientists front-row seats to magic's action in the brain and may **yield insight** into the very basis of consciousness itself.

Every effort was made to ensure that the items selected met all the aforementioned criteria. Thus, in the fifth phase, the list was subjected to another enhancement in which all duplicated examples were removed automatically with an Excel function. This was thought to be an objective means to ascertain that each word included in the targeted collocation list was unique in the sense that it appeared only once. An additional manual inspection had to be performed, as further items, which Excel had missed, were discarded in order to ensure that all items included were unique. For instance, *approve a recommendation* and *negotiate an arrangement* were the random selections for inclusion, whereas *secure an approval* and *arrange delivery* were consequently excluded, as they each contained a word that is found in another collocation from the list. This rigorous effort resulted in 48 candidate collocations of unique component words. This list was further reduced to 44 in the final step described in Section 5.2.3.

5.2.3 The Children's Dictionary

In a further attempt to ensure the suitability of the selected items for the age range of the targeted students, and in order to find out the number of senses for each constituent word of the potential collocations, a children's dictionary, *The Word Explorer Children's Dictionary* (Parks, 2021), was employed. This dictionary, freely available online at https://kids.wordsmyth.net/we/, was developed especially for children at upper elementary or middle school. The use of this dictionary in particular served two purposes at this point. First, it served as a method to confirm that all words in the potential collocations included in the list were appropriate for students aged 14 or 15 at a pre-intermediate level of English language

proficiency. Second, as this dictionary was intended to be a key resource for teaching the definitions of all the words of the targeted collocations in the training phase, it was necessary to ensure that all words considered for inclusion in the targeted collocations list could be found in this dictionary and that their multiple senses were accessible to the targeted students. For example, the verb *possess* in the collocation *possess a talent* has three senses, whereas the noun *talent* has two senses, as seen in the following two excerpts (Figure 5.1) from *The Word Explorer Children's Dictionary:*

pos·sess	
definition 1:	to own or have. *I now **possess** a new bicycle.* *She **possesses** good writing skills.*
definition 2:	to have as a part of one's character. *That author **possesses** a great sense of humor.*
definition 3:	to control the actions of. *The desire to be class president **possessed** him.*

tal·ent	
definition 1:	a natural skill or ability. *He has a **talent** for acting, so he will be the star of the play.*
definition 2:	a person or group of people who have or show talent. *We've won many trophies because there is a lot of **talent** on our football team.*

Figure 5.1: Two example definitions of the two words, *possess* and *talent*, taken from *The Word Explorer Children's Dictionary*

However, some of the candidate collocations were excluded, such as *acquire awareness*, as the definition of awareness as a noun was not in the dictionary. This restriction shortened the list of collocations from 48 to 45 items. In a later stage of this research, one item was also

discarded as it proved to be familiar to some of the targeted students and thus the complete final list of targeted collocations consisted of 44 items.

5.2.4 Controlling for L1 Congruency

One main factor which is widely recognized to influence the acquisition of English collocations is L1-L2 congruency (e.g., Nesselhauf 2005; Sadeghi 2009; Wolter and Gyllstad 2011, 2013; Wolter and Yamashita 2017; Yamashita and Jiang, 2010; see also Chapter 3 for more detailed discussion on the effect of this factor). A collocation is considered congruent in L1 and L2 if it has a word-for-word translational equivalent in L1, whereas an incongruent collocation is always L2-specific and does not have a direct translation in L1. For example, the English collocation *white lie* has a word-for-word translation in Arabic — كذبة بيضاء — and is therefore considered congruent in both languages. The English collocation *heavy smoker* might be translated into Arabic as مدخن شره (* excessive smoker) but not as * مدخن ثقيل, which is the literal translation of *heavy smoker*. In other words, the collocation does not have a direct translation equivalent and is therefore incongruent. Thus, in the sixth phase of the item selection process, examining the congruency status of all 44 targeted collocations was imperative in order to eliminate any possible confounding influence of this variable on L2 learners' performance. Consequently, any observed influence would be traceable to the degree of semantic transparency.

All 44 targeted collocations were initially classified as congruent based on the judgment of the researcher, who is a native speaker of Arabic, which is also the L1 of the targeted learners in this study. However, in order to have a more reliable method for estimating the congruency status of the items, an English-Arabic congruency judgement task was designed. This task offered guidelines that explained the concept of L1-L2 congruency and provided examples demonstrating how this task could be completed. The task asked the participants to translate each of the 44 collocations from English into Arabic and then to decide whether

each English collocation was congruent or incongruent based on the definition of congruency provided (Appendix A shows a sample of this congruency judgment task). This task was completed by three certified Arabic-English translators. Based on their judgments of the congruency status, all 44 collocations were categorized as congruent, confirming the researcher's judgment. Thus, it was decided that there was no need to collect more congruency judgments, as all three certified translators, in addition to the researcher' own informed intuition, had all agreed in their estimation of the congruency status of the candidate collocations. The final list of targeted collocations was therefore those shown, above, in Table 5.1 and Table 5.2.

5.3 Eliciting human transparency ratings

The primary goal of this thesis is to test the effect of semantic transparency on L2 collocation acquisition. The literature review (Chapter 3) revealed that the few available studies that investigated the semantic transparency effect on collocation knowledge were limited as they did not establish the semantic transparency of the targeted collocations with carefully developed assessment methods (see Chapter 2, Section 2.3 and Chapter 3, Section 3.3.4 for a critique of the methods used). Consequently, the focus of the seventh phase of the selection procedure in this research was to ascertain that the candidate collocations showed multiple levels of semantic transparency, using rigorously developed methods of assessment. The first method used to establish the degree of semantic transparency of the 44 experimental items was human ratings. The decision to use human ratings was made because it is considered the most common and highly reliable method for establishing the semantic transparency of complex expressions (Wang et al., 2013, p.286). A questionnaire was carefully devised in an attempt to elicit reliable transparency ratings of the collocation items.

5.3.1 Rating questionnaire

The rating task that was developed for this study as a measure of the semantic transparency of the selected 44 collocations was based on the rigorously developed rating questionnaire of Reddy, McCarthy and Manandhar (2011). Their rating task was successful in producing a continuum of semantic transparency of their multiword items (see Chapter 2, Section 2.3.1 for a detailed description of the development of their rating questionnaire). In line with their study, a guidelines page was included for the rating task of the present study (shown in Figure 5.2) and was employed here to assist the raters in making more informed semantic judgments. Within the guidelines, the concept of semantic transparency was defined as the extent to which the meanings of the component words of a phrase contribute to the meaning of the whole phrase and the extent to which the meaning of a phrase can be predicted or understood from the meanings of its two component words. In addition to the definition, a few examples of rated collocations, with explanations of how these collocations have been rated based on their perceived relative semantic transparency, also formed part of the guidelines provided. Moreover, it was stressed in these guidelines that this task was subjective and that there were no right or wrong answers.

Semantic transparency is viewed here as a scalar notion; therefore, a six-point scale was adopted in the rating task, ranging from (0) for fully opaque collocations to (5) for fully transparent ones. Similar to Reddy, McCarthy and Manandhar (2011), semantic transparency is regarded as a property of not only the component words of a collocation but also the whole collocation (Marelli and Luzzatti, 2012; Reddy, McCarthy and Manandhar, 2011). Hence, the rating task was designed to obtain the transparency judgement of the whole collocation alongside its component words. More specifically, the semantic transparency conceptualization was in terms both of rating the extent to which each of the verbs or nouns (individually) within the collocation was semantically transparent and the extent to which the

whole collocation was semantically transparent. Three separate tasks for each collocation were devised to control for bias in the semantic transparency judgments: one evaluating the transparency of a collocation as a whole; two for each of the two constituent words of that collocation. Figures 5.3, 5.4, and 5.5 present examples of the three question types used in the transparency rating questionnaire for the collocation *display emotion*:

How transparent in meaning ...?

In the contexts below, the task is to decide **either** to what extent a ***given word*** within a phrase is semantically transparent, **or else** to what extent the ***whole phrase*** is semantically transparent.

Semantic transparency refers to the extent to which the meaning of the component words of a phrase contribute to the meaning of the whole phrase, and the extent to which the meaning of a phrase could be predicted or understood from the meanings of its component words.

In each task, give the word or phrase a rating between 0 and 5, by marking 'x' in the appropriate box.

* 0 means: fully opaque /non-transparent, the meaning of the word or phrase is difficult to figure out or to be understood literally.
* 5 means: fully transparent, the meaning of the word or phrase is easily or fully understood very literally.
* Use values in between to grade your decision.

Note: In the examples below, scores don't imply a right answer. The task is subjective and there is not a single correct answer. Instead we are asking for your opinion.

Example 1:
I have decided to **take a course** in History this semester.
How transparent in meaning is the use of "take" in the phrase "take a course"?
- YOUR ANSWER: might be 1
- Reason: "take" here does not refer to physical action of taking but means to enroll in a course and so the meaning of "take" contributes very little to the meaning of the phrase "take a course".

Example 2:
I **took money** from my mom's purse and she thought it was my brother.
How transparent in meaning is the use of "take" in the phrase "take money"?
- YOUR ANSWER: might be 5
- Reason: "take" means literally moving something from one place to another which is the meaning denoted in the phrase "take money".

Example 3:
He asked the doctor to **take a look** at his cut.
How transparent in meaning is the *phrase* "take a look"?
- YOUR ANSWER: might be 3
- Reason: the meaning of the whole phrase is derived from only one of its words "look" and no sense of "take" is found in meaning of this phrase. So, this phrase would be rated midway between transparent and non-transparent.

Example 4:
They were arguing, but I did not want to **take sides**, so I left.
How transparent in meaning is the *phrase* "take sides"?
- YOUR ANSWER: might be 2

Reason: the phrase here means “to choose one side of an argument”. There is no sense of the word “take” in the phrase. Yet, the phrase would not be considered fully opaque because there is some meaning of “side of argument” from the word “sides”.

Figure 5.2: Guidelines page of the semantic rating questionnaire

How transparent in meaning ...?

display emotion

Definition:
show any strong feeling

Examples:

1. … Madhavi erupted in tears and fled when a family with a small boy entered; never one to display emotion in public much less break down like that, she hurried out without touching her mug of perfectly sweetened cappuccino…
2. .... All those surging backs and stretching limbs, those contorted poses, that strident heroic display of feeling in the human body - and really, the only muscles you need to display emotion are your lips.
3. For a moment, he stepped out of type. For a moment, he displayed emotion that he usually masks so well.
4. … " We've had a lot of fun playing together. " Opponents such as the Kansas City Royals' Roberto Hernandez enjoy playing against Williams because he doesn't show off or display emotion on the field.
5. … Each model emphasizes empathy and seeing the situation from the patient's perspective, and each uses the skill of briefly being silent when the patient displays emotion.

Note: Please select your answers carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **" display "** in the phrase **“display emotion”**

Fully opaque — Fully transparent

0	1	2	3	4	5

Please provide any comments in case you want to or any other queries/suggestions! Not mandatory but helpful:

Figure 5.3: Example of a rating task used to evaluate the semantic transparency of the verb of the collocation

How transparent in meaning ...?

display emotion

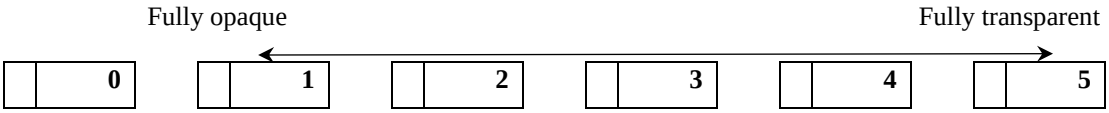
Definition:
show any strong feeling

Examples:

1. … Madhavi erupted in tears and fled when a family with a small boy entered; never one to display emotion in public much less break down like that, she hurried out without touching her mug of perfectly sweetened cappuccino…
2. .... All those surging backs and stretching limbs, those contorted poses, that strident heroic display of feeling in the human body - and really, the only muscles you need to display emotion are your lips.
3. For a moment, he stepped out of type. For a moment, he displayed emotion that he usually masks so well.
4. … " We've had a lot of fun playing together. " Opponents such as the Kansas City Royals' Roberto Hernandez enjoy playing against Williams because he doesn't show off or display emotion on the field.
5. … Each model emphasizes empathy and seeing the situation from the patient's perspective, and each uses the skill of briefly being silent when the patient displays emotion.

Note: Please select your answers carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"emotion"** in the phrase **"display emotion"**



Please provide any comments in case you want to or any other queries/suggestions! Not mandatory but helpful:

Figure 5.4: Example of a rating task used to evaluate the semantic transparency of the noun of the collocation

How transparent in meaning ...?

display emotion

Definition:
show any strong feeling

Examples:

1. … Madhavi erupted in tears and fled when a family with a small boy entered; never one to display emotion in public much less break down like that, she hurried out without touching her mug of perfectly sweetened cappuccino…
2. .... All those surging backs and stretching limbs, those contorted poses, that strident heroic display of feeling in the human body - and really, the only muscles you need to display emotion are your lips.
3. For a moment, he stepped out of type. For a moment, he displayed emotion that he usually masks so well.
4. … " We've had a lot of fun playing together. " Opponents such as the Kansas City Royals' Roberto Hernandez enjoy playing against Williams because he doesn't show off or display emotion on the field.
5. … Each model emphasizes empathy and seeing the situation from the patient's perspective, and each uses the skill of briefly being silent when the patient displays emotion.

Note: Please select your answers carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **"display emotion"**

Fully opaque — Fully transparent

0	1	2	3	4	5

Please provide any comments in case you want to or any other queries/suggestions! Not mandatory but helpful:

Figure 5.5: Example of a rating task used to evaluate the semantic transparency of the verb of the collocation

In total, 132 tasks were created then randomly allocated to one of three versions of the semantic rating questionnaire, so that even though each version had a total of 44 collocations, each with a corresponding rating task, it included a different task type for each targeted collocation than those in the other two versions. The presentation of the collocations in all these rating tasks, either with or without an intervening article, was based on their most frequent pattern found in COCA context sentences. (These are also the collocation structures which were used during their presentation and teaching to the targeted students in the

pedagogical intervention, as reported in the next chapter.) Some measures, which were similarly applied by Reddy, McCarthy and Manandhar (2011), were taken to control for factors such as ambiguity of expression and the subjectivity of raters which could affect the reliability of the estimates of semantic transparency. Each rating task provided contextual information for each targeted collocation in order to avoid ambiguity in the meaning of the collocation. Therefore, each task included a definition of the targeted collocation based on definitions taken from WordNet and five example sentences randomly chosen from COCA. The raters were asked to base their ratings on the definition of the collocation that they considered most frequently applicable in the five examples provided. Moreover, to reduce the bias of any rater's particular approach to estimating semantic transparency, each rater was randomly assigned one of the three separate tasks created for each collocation. Thus, each rater could judge only one of three rating tasks for any given collocation.

In the process of developing the rating task, efforts were made to conform as closely as possible to the procedure of Reddy, McCarthy and Manandhar (2011), but some alterations (related to the procedure followed to obtain the definitions and example sentences of the targeted collocations) were warranted. Following the above authors, WordNet was chosen as the chief source used to find precise definitions of the collocations. However, one difficulty was the lack of definitions that represented the meaning of the whole collocation for any of the 44 candidate collocations either in WordNet or in any alternative English dictionary. Only the definitions of the constituent words alone, but not the definitions of the collocation as a whole, existed in most available dictionaries. Another matter that needed to be resolved related to the necessity of ensuring that the example sentences included in the rating task were representative of the actual collocation's sense. These two issues were addressed by the step-by-step procedure outlined in the following paragraphs.

For every item, 10 random example sentences from COCA (i.e., concordances lines within which the collocation of interest was embedded) that fitted the search pattern adopted here were selected as a first step (i.e., based on the search parameters employed to retrieve the targeted collocations form COCA, as described in Section 5.2.2). Subsequently, the number of senses for each collocation found in the randomly chosen 10 example sentences had to be determined. For example, in the search for the possible senses of the collocation *assist recovery*, how often it occurred with the sense "*give help in returning to an original state*" was counted, before it was checked to see if it occurred with other senses, such as "*give help in retrieval /regaining or saving something lost.*" The two most frequent patterns were then taken as the selected senses of the collocation, so that a given collocation might generate two readings. For example, if a collocation occurred six times with one sense and four times with a different sense, those two senses would be selected; however, if it occurred with another sense only twice or less, this sense was ignored. As it turned out, most of the targeted collocations had only one sense (or a dominant reading) occurring most frequently in the random example sentences. For example, *assist recovery* occurred more frequently with the sense "*give help in returning to an original state*" than its other sense of "*give help in retrieval/regaining or saving something lost.*"

After the most frequent sense of a collocation had been established, the definition of the sense of the collocation had to be constructed from WordNet.[18] The respective senses of the two component words of a collocation were combined following a clear procedure as follows. For example, when constructing a definition for the collocation *assist recovery*, the verb *assist* and the noun *recovery* are defined in WordNet as:

[18] This is because, as mentioned above, the definition of the whole collocation on a phrasal level could not be found in any dictionary.

- ASSIST: (v) help, assist, aid (give help or assistance; be of service) “Everyone helped out during the earthquake”; “Can you help me carry this table?”; "She never helps around the house”; and
- RECOVERY: (n) recovery (return to an original state) “the recovery of the forest after the fire was surprisingly rapid.”

The meaning of this collocation was constructed by simply combining the two phrases defining its component words to produce the definition “give help in returning to an original state.”

The construction of the definitions involved the application of further specific principles to arrive at the best possible representative definition for each of the 44 targeted collocations. This also involved trying to keep the definition as simple and streamlined as possible. Furthermore, in the construction of the definitions, the use of the same words as those in the collocation was avoided, as this could have made the definition circular (the use of this constraint was not employed in Reddy, McCarthy and Manandhar (2011), some of whose definitions included constituent words of the defined compound). Moreover, words that were not essential to the understanding of the definition were excluded. For example, the definition of *restore* in the collocation *restore trust* was “*bring back into original existence, use, function, or position*,” but was reduced to just “*bring back.*” However, it was important to ensure in the process of keeping the definition as short as possible not to lose anything essential to the meaning. Again, with the example collocation *restore trust*, *trust* is defined in WordNet as: S: *(n) faith, trust (complete confidence in a person or plan etc)* “*he cherished the faith of a good woman*”; “*the doctor-patient relationship is based on trust.*” Using only “*complete confidence*,” for example, does not capture the full meaning of the word *trust*, which needs the inclusion of other words in its definition, so the appropriate sense of *trust* here is “*complete confidence in a person or plan etc.*”

Selectiveness was another important criterion followed in the construction of the definitions. The best definition of the collocation of interest was not necessarily achieved by the inclusion of all possible alternatives given in WordNet, but instead by finding a single word or few words that covered them all. For example, the constructed definition of *restore trust*, "*bring back complete confidence in a person or plan etc.*," was replaced by "*bring back complete confidence in something or someone*" to create a more inclusive definition. In addition, all definitions were checked with regards to the extent to which they accurately reflected the included related examples. For example, the definition of *treaty* in the collocation *implement a treaty* is "*apply a written agreement between two states or sovereigns*," which does not capture the fact that more than two entities can be involved, a meaning conveyed in the example sentences provided for this collocation. Therefore, it was thought to be more accurate to use only "*between states … .*" Hence, the created definition of *implement a treaty* came to be "*apply a written agreement between states or institutions in a manner consistent with its purpose or design.*" Furthermore, in an attempt to reduce the ambiguity of the constructed definitions, difficult vocabulary was avoided. For example, again as in the definition of *treaty*, the word *sovereigns* was replaced with *institutions*. In some cases, more general definitions in WordNet were chosen when they were found to capture the examples more accurately. For example, the definition of *award* in the collocation *deserve an award* is *"a tangible symbol signifying approval or distinction"* and better covered the examples than other included definitions of *award*, such as "*something given for victory or superiority in a contest or competition*," since not all the example sentences included necessarily involved a contest or competition.

This labor-intensive effort to construct the best possible definitions of the targeted collocations was intended to arrive at more reliable estimates of the semantic transparency of the targeted collocations. The final sample of the semantic questionnaire, in all its three

versions, consisted of a rating task for each collocation of the 44 targeted collocations. Each rating task included a constructed definition for a collocation and five example sentences within which the given collocation was embedded. It also contained a rating scale showing the digit points 0–5, as well as the two phrases 'Fully opaque' at the (0) end of the scale and 'Fully transparent' at the (5) end of the scale. (See Appendix B for a sample of the semantic rating questionnaire.)

5.3.2 Participants and recruitment procedure

With this carefully designed transparency questionnaire, the transparency judgments of 46 participants were obtained. All participants had knowledge of and experience in linguistics and English language teaching to make their ratings or estimates of the semantic transparency of the targeted collocations more reliable, on the basis that their knowledge of the semantics of words would mean that their rating was based on informed judgments. For the sake of consistency, and taking into consideration that all targeted collocations were retrieved from COCA, all participants were native speakers of American English. The rating data was collected in Saudi Arabia, where all participants were contacted in person. Some of them had been working as English language teachers in Saudi Arabian universities, whereas others were visiting during the International Exhibition & Conference on Higher Education held between 10–13 April 2019 in Riyadh. All of them completed either a paper-based or a computer-based version of the semantic transparency questionnaire.

All the participants signed a consent form and were assured that the information they provided in this questionnaire would remain confidential and would be used only for the purpose of this research. A sample of the participant consent form and information sheet are provided in Appendix C. 15 participants completed version 1; 15 participants completed version 2; and 16 participants completed version 3. These ratings were combined to give a total of 2,024 ratings for the 44 collocations that were completed by 46 raters, and these

ratings were recorded on an Excel sheet. Each rater was assigned a random number, and for each rater it was shown which task version he/she had worked on when rating each collocation (i.e., what type of rating was completed and whether it was related to the whole collocation or to one of its component words). When these ratings were documented, there were no missing values except for one rating of the collocation *resist infection* by Rater 15, which was coded as NA. The following section reports the results of the analysis of these ratings, the discussion of which is included in Section 5.7.

5.4 Results of human transparency ratings

This section gives an account of the analysis of the data collected from the human transparency ratings and reports its main findings. A descriptive analysis was carried out and inferential statistics were obtained using SPSS in order to find out whether the responses to the rating questionnaire yielded a good range of semantic transparency of the experimental items. Furthermore, some tables and graphs were produced as a means to explore the data in general, to examine raters' agreement with respect to the semantic ratings of the collocations, and also to inspect and the relative contribution of each noun and verb to the degree of transparency of the collocation.

5.4.1 Relative contributions of the noun and verb

Figure 5.6 displays the frequency distribution of all semantic transparency ratings of the 44 collocations by the 46 raters. It demonstrates a good range of semantic transparency levels for the 44 collocations and shows a continuum of semantic transparency that gradually increases from the minimum rating point (0), indicating full semantic opacity, to the maximum rating point (5), indicating full semantic transparency. However, it is clear from the frequency bar plot that the ratings are generally skewed towards the more transparent end of the rating scale. It appears that most of the 44 rated collocations were perceived as transparent, as the rating (5), which refers to the highest degree of semantic transparency, was

the most frequent rating given by the raters (593/2023 transparency ratings were rated as (5)). Many of the collocations were rated as (4) (489/2023) and (3) (418/2023), and these rating points also denote a somewhat transparent level of meaning. Fewer collocations that were rated as less transparent. This is likely due to the fact that the majority of English collocations are generally transparent compared to other multiword expressions such as compounds or idioms.

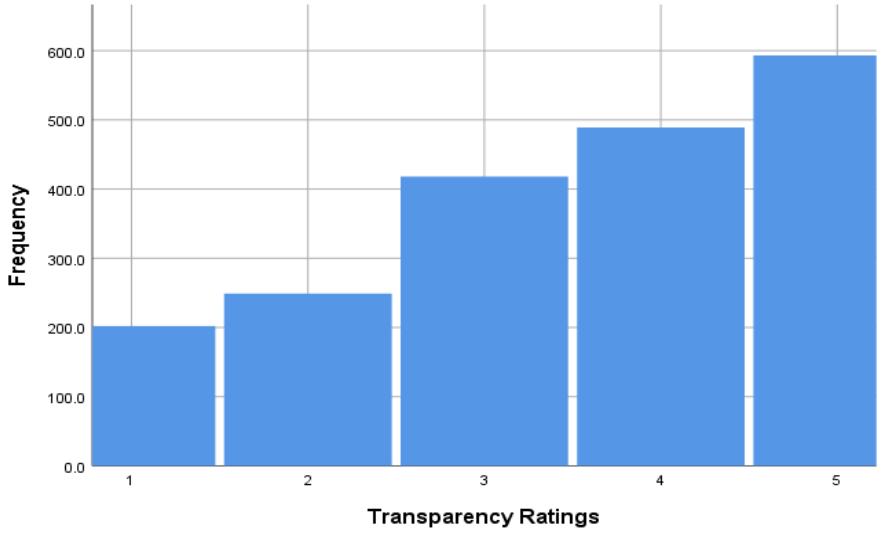


Figure 5.6: Bar plot of the frequency distribution of all raw semantic transparency ratings of the collocations

As explained in the account of how the rating questionnaire was designed (see Section 5.3.1), the questionnaire consisted of three types of rating questions, each targeting either the verb, the noun or the whole collocation. These three separate ratings are graphically represented in Figure 5.7 by the three side-by-side box plots. The comparison between these separate ratings shows that most ratings were high, as all three types of ratings had a median of (4) and all data was skewed toward the highest transparency level in the scale, viz, (5). However, as seen in the graph, there is more variance in the interquartile range of the ratings of both verbs and whole collocations than in the ratings of nouns. The first quartile of the

nouns ratings was (3) which is at a higher level than those for the verbs and the whole collocations (2). The similarity between the verb and collocation ratings might suggest that when collocations were perceived as less transparent, it was because their verbs were perceived as less transparent. Consequently, it might be hypothesised that the verbs contributed more than the nouns to the perceived transparency of the collocations, i.e., that the verbs rather than the nouns carry most of the semantic weight of these particular verb-noun collocations.

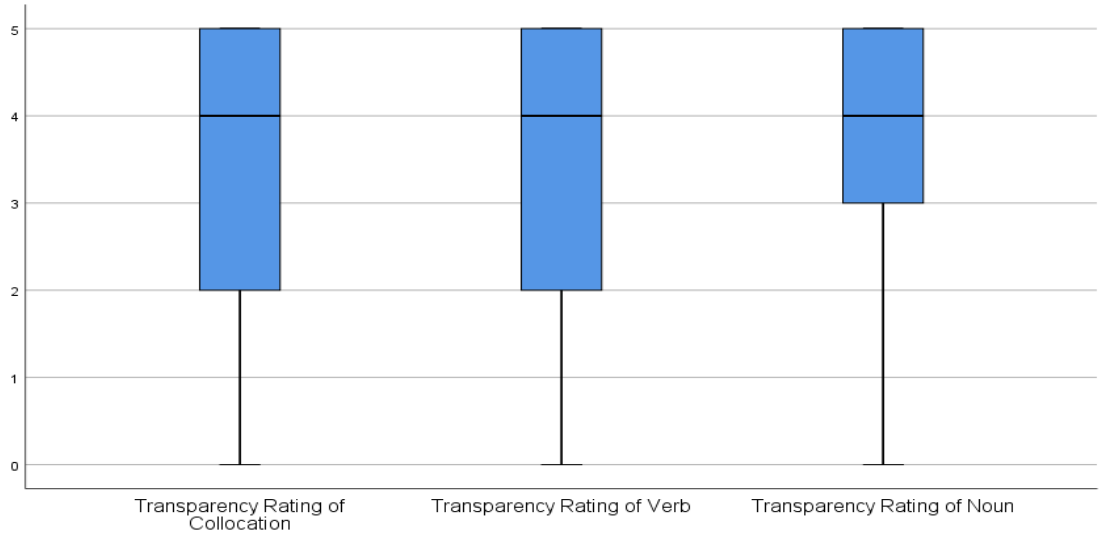


Figure 5.7: Box blots of the separate ratings for the nouns, verbs and whole collocations

To further explore the relative semantic weight of the verbs and nouns, as well as the level of agreement between raters, three scatter plots were produced (Figures 5.8–5.10) and correlations were calculated. Although the data is not normally distributed, it is widely acknowledged that the mean gives a more fine-grained measure than the mode or median, which can only take whole number values. Therefore, the scatter plots and the calculated correlation coefficients were here carried out with the mean values for the verb, noun and collocation. Figure 5.8 displays a positive linear relationship between the mean transparency rating of the verb and that of the collocation. A similar positive linear correlation is illustrated in Figure 5.9, which represents the relationship between the mean transparency ratings of the

noun and the collocation. The third scatter plot (Figure 5.10) graphically shows that the mean transparency ratings for each of the verbs and the nouns are also positively correlated in a linear pattern. To find more precise evidence for these observed correlations, Spearman's correlation coefficients (this test was chosen because the data was not normally distributed) were calculated between the mean transparency ratings for the verb, noun and collocation. The correlations between all three transparency rating types were found to be statistically significant (p value < 0.01). The strongest correlation with highest coefficient values ($r_s(42) = .91$, $p < .01$) was between the mean transparency rating of the verb and that of the collocation, while the correlation between the mean transparency rating of the noun and the collocations was also strong with ($r_s(42) = .88$, $p < .01$). Similarly, a strong correlation was revealed between the mean transparency rating of the noun and the verb ($r_s(42) = .90$, $p < .01$). The strong correlation between the different elements of the collocations, viz, the verb, noun and whole collocation, indicates that there was a strong agreement between the raters. In other words, even though different raters rated different elements of the collocations, they nevertheless produced ratings that strongly correlated with one another (though it should be noted that the correlation observed here does not imply a causal relationship). However, although very strong correlation was between all three rating types, the highest correlation was between the verb and collocation speaks against the hypothesis that most of the semantic weight is carried by the noun.

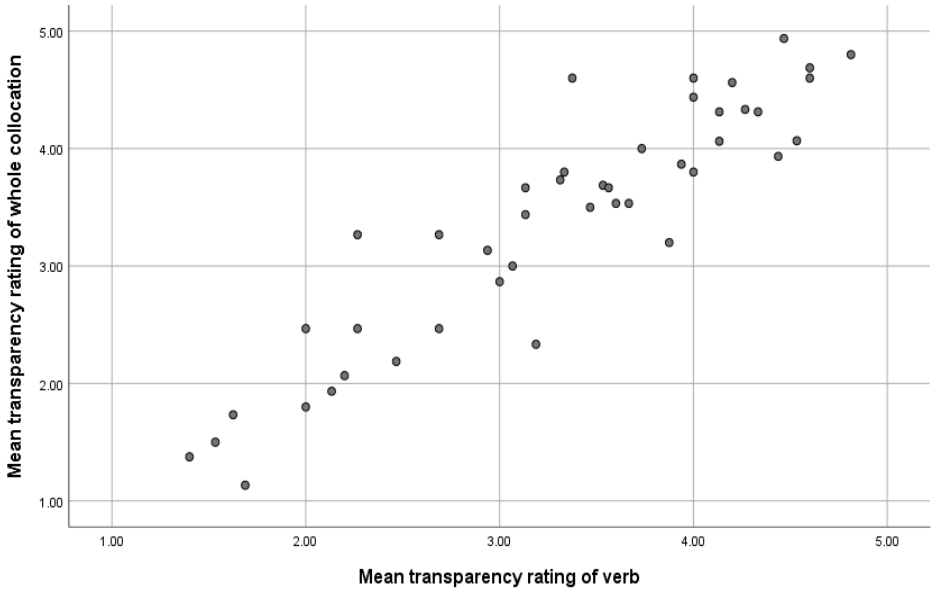


Figure 5.8: Scatter plot of the mean transparency rating of verb against the mean transparency rating of collocation as whole construction

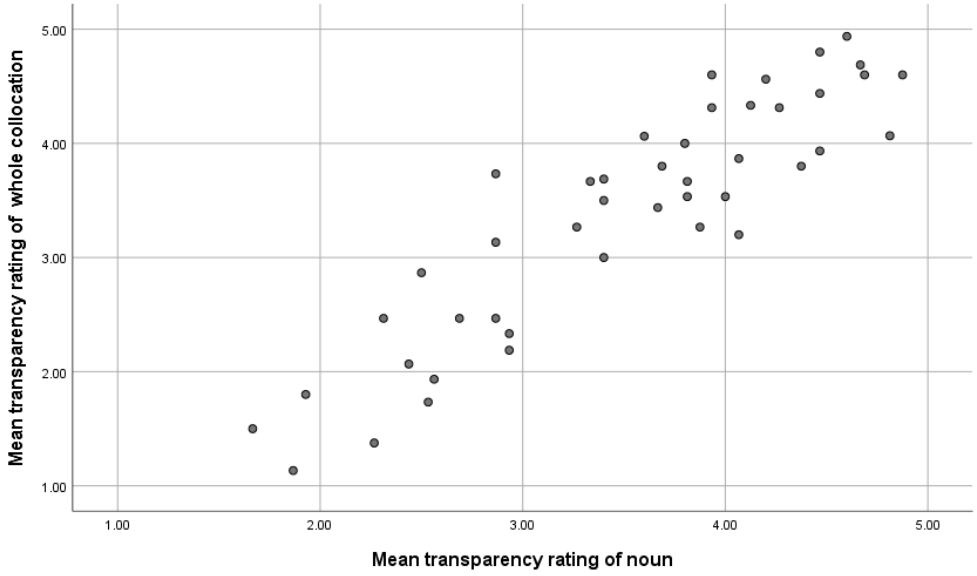


Figure 5.9: Scatter plot of the mean transparency rating of noun against the mean transparency rating of collocation as whole construction

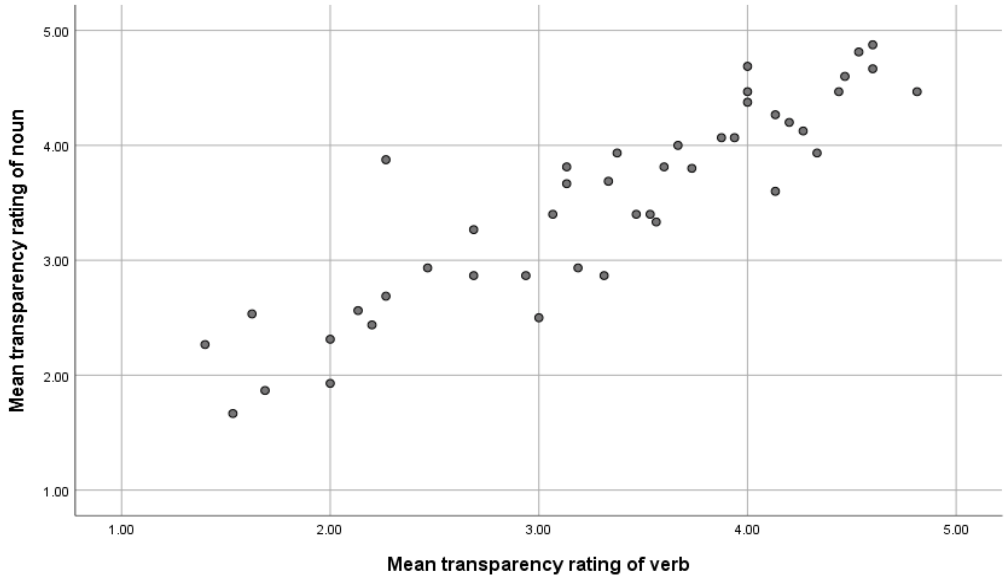


Figure 5.10: Scatter plot of the mean transparency rating of verb against the mean transparency rating of noun

5.4.2 Distribution of transparency ratings across collocations

Table 5.3 summarizes the ratings for each collocation. It shows the mean values for the ratings of the verb, noun and whole construction of each collocation item. The table has been arranged in ascending order based on the values of this column. It also displays the mode and the median of the whole construction. The rightmost column represents the modal rating of all transparency ratings for each collocation. Based on the mean values of the whole construction, the table shows that the collocations which were perceived as the least transparent are *arrest the decline*, *plant a flag*, *race the clock*, *exercise the imagination*, *resist infection* and *cast a reflection*. Those same collocations were also the lowest perceived collocations based on the mean values of their verbs and nouns. The five collocations, *negotiate an arrangement*, *occupy territory*, *switch channel*, *doubt the existence* and *approve a recommendation*, were the highest perceived transparent collocations by their mean values for the verb, noun and as a whole construction.

Table 5.3: Mean ratings for verb, noun and whole collocations; the median and mode for the whole collocation; and the mode of all transparency ratings by collocation

No	Collocation	Mean (Verb)	Mean (Noun)	Mean (Collocation)	Mode (Collocation)	Median (Collocation)	Mode (All)
1	arrest the decline	1.69	1.87	1.13	0	1	1
2	plant a flag	1.4	2.27	1.38	1	1	1
3	race the clock	1.53	1.67	1.5	1	1	1
4	exercise the imagination	1.63	2.53	1.73	1	2	2
5	resist infection	2	1.93	1.8	1	1	1
6	cast a reflection	2.13	2.56	1.93	2	2	2
7	display emotion	2.2	2.44	2.07	3	2	1
8	adapt a recipe	2.47	2.93	2.19	1	1	1
9	assess a personality	3.19	2.93	2.33	2	2	2
10	bury waste	2	2.31	2.47	1	1	1
11	distribute electricity	2.27	2.69	2.47	1	2	2
12	dismiss a suggestion	2.69	2.87	2.47	2	2	2
13	rule the universe	3	2.5	2.87	3	3	2
14	shape the curriculum	3.07	3.4	3	3	3	3
15	practice a craft	2.94	2.87	3.13	3	3	3
16	yield an insight	3.88	4.07	3.2	4	3	4
17	accompany an exhibition	2.27	3.88	3.27	3	3	3
18	contact the manufacturer	2.69	3.27	3.27	2	3	2
19	possess (a) talent	3.13	3.67	3.44	3	3	3
20	implement a treaty	3.47	3.4	3.5	3	3	3
21	inform selection	3.6	3.81	3.53	4	4	4
22	overcome a barrier	3.67	4	3.53	3	3	4
23	detect an error	3.13	3.81	3.67	5	3	3
24	vary the height	3.56	3.33	3.67	3	3	3
25	celebrate a wedding	3.53	3.4	3.69	3	3	3
26	restore trust	3.31	2.87	3.73	3	3	3
27	enable the viewer	3.33	3.69	3.8	4	4	3
28	monitor pollution	4	4.38	3.8	4	4	4
29	balance a load	3.94	4.07	3.87	4	4	4
30	process a request	4.44	4.47	3.93	5	4	5
31	assign priority	3.73	3.8	4	4	4	4
32	deserve an award	4.13	3.6	4.06	4	4	4
33	impose a penalty	4.53	4.81	4.07	4	4	5
34	permit entry	4.13	4.27	4.31	5	4	4
35	translate a phrase	4.33	3.93	4.31	5	4	4
36	accomplish an objective	4.27	4.13	4.33	4	4	4
37	assist recovery	4	4.47	4.44	5	5	5
38	enhance someone's reputation	4.2	4.2	4.56	5	5	4
39	embrace diversity	3.38	3.93	4.6	5	5	5
40	occupy territory	4	4.69	4.6	5	5	5
41	negotiate an arrangement	4.6	4.88	4.6	5	5	5
42	switch channel	4.6	4.67	4.69	5	5	5
43	doubt the existence	4.81	4.47	4.8	5	5	5
44	approve a recommendation	4.47	4.6	4.94	5	5	5

5.5 Computational Measures

Human transparency judgments are the most common and probably considered the most reliable method employed in the literature to establish the degree of semantic transparency of various linguistic constructions. However, one drawback of this method is its difficulty in terms of the time and expense needed to collect pooled reliable human ratings for a large number of collocations. A computational method such as distributional semantic measures (see Chapter 2, Section 2.3.3) that makes use of the distributional information of the collocations to automatically estimate their semantic transparency might be a good alternative to overcome labor intensity of collecting human ratings. Furthermore, in the context of this thesis, distributional semantic measures can be used as an additional method to assess the semantic transparency of the selected collocations, and thus serve as a methodological triangulation of the results of the human ratings. Therefore, one of the main goals of this section is to examine the feasibility of this second method, the distribution-based method, in estimating the relative semantic transparency of the targeted collocations in comparison to human transparency ratings, which represent the 'gold standard' in this domain.

Before reporting the methodology for measuring the degree of semantic transparency of the collocation items using distributional semantic measures, it is useful to explain the hypothesis on which this method is based. It is assumed that if the component words of a collocation belong to the same semantic fields as one another, they are likely to retain their core meanings in the collocation and accordingly are expected to combine naturally to form the collocation. On the other hand, if the two component words occur in very different contexts, combining them in the collocation might seem more unexpected, as they will most likely display more specific meanings or shift from their core meanings. Accordingly, three hypotheses can be proposed. First, *the higher the cosine similarity between the meaning vectors of the two component words of a collocation, the greater the degree of semantic*

transparency of the collocation. This is because, as explained above, any two words with similar co-occurrence patterns are expected to retain their core senses and hence be regarded as more transparent in meaning when they are combined to form a collocation. A second possible hypothesis pertains to the assumption that the closeness in meaning of one of the component words to the collocation to which it belongs decides the transparency of the collocation. Therefore, it can be hypothesized (2) *that a higher distributional similarity between the verb (first component word) and the entire collocation can reflect the higher semantic transparency of the collocation*. This is because a verb that shares co-occurrence patterns with a collocation is more likely to be used in its core sense in that collocation, rendering the collocation more transparent. Similarly, it can be hypothesized (3) that a *higher distributional similarity between the noun and the entire collocation indicates a higher semantic transparency level of the collocation*, because the higher the number of shared co-occurrences between the noun and the collocation, the more it is expected the noun is being used in its core sense. In other words, this closeness or difference in meaning between the noun and the collocation determines the transparency of the meaning of the whole collocation. These three hypotheses were tested in this study. In particular, I investigated the possibility of using distributional semantic measures based on either the constituents or the entire collocation to estimate the semantic transparency of the 44 targeted collocations. The following section describes the methodology in more detail.

5.5.1 Selection of computational measures

The potential for distributional semantic-based measures, as explained in the previous section, to be used as an alternative method to estimate the semantic transparency of the 44 candidate collocations was the focus of the investigation at this point of research. Distributional semantic techniques depend on having information about how often and how closely words co-occur in a large corpus of the relevant language. This information is

represented as a numerical vector for each word, with each number in the vector indicating how often the word occurs in the vicinity of one of a set of reference words. In the time that has elapsed since this work was carried out, semantic vectors for many English words (also called 'word embeddings') have been made available online and can now be freely downloaded from such repositories as Fares et al. (2017); Mikolov et al. (2018); and Pennington, Socher and Manning (2014). However, at the time when this study was being undertaken there were no such repositories of which I was aware, and it was therefore necessary for me to seek help in obtaining bespoke semantic vectors for the constituents of my selected collocations.

The distributional measures employed in this study were based on the work of Reddy, McCarthy and Manandhar (2011), who made available the Python scripts (computer codes) which were used in their study to extract the semantic vectors of their items from ukWaC (Ferraresi et al., 2008) (a text corpus of about two billion words of British English collected from a .uk web domain). This corpus, ukWaC, was also used in the present study to extract the semantic vectors of the targeted collocations. While it could be argued that it might have been more appropriate to use COCA, as the data in this study was based on US English, to be as consistent as possible with the above authors, whose Python scripts were also relied upon to extract the semantic vectors of the collocation items, the ukWaC was considered more applicable and the computer codes assumed to work better with this corpus. This corpus is also considered superior to COCA in terms of its size and availability. While COCA is a corpus of 560 million words, the ukWaC is about two billion words. A further reason for not using COCA related to the unavailability of this corpus for download at the time of data collection for this study. It is also worth noting that, even though the ukWaC is mainly based on British English, it is likely to include other variants such as US English which can be found on a .uk domain.

As the use of the adapted computer codes required expertise in computational linguistics and distributional semantics, this was carried out by one of the advisors for this thesis, Dr. Martin Schaefer, who was more qualified for this task than I was. However, I myself carried out all the subsequent analyses using the calculated distributional measures. What follows is a description of the different distributional measurements calculated for the targeted collocations. Dr. Schaefer used the computer codes adapted from Reddy, McCarthy and Manandhar (2011) to extract comparable vectors for each noun and verb individually as well as for each targeted collocation in this study. Similar parameters to those used by these authors were also used here. This involved looking for the co-occurrences of each of the nouns, verbs and collocations in the same sentence as the 10,000 most frequent content words in the ukWaC corpus. Another criterion adhered to here, also followed by Reddy, McCarthy and Manandhar in their study, is that all collocations had at least 50 occurrences in ukWaC. This is because collocations needed to be frequent enough (compared to single words) in the corpus to be treated as single longer units with their own vector, so that their co-occurrences with other words could be calculated in the same manner as for single words.

The vectors for each of the 44 targeted collocations were calculated in two different ways. In one case, the collocations were defined in the search as verb and noun combinations with optionally one word in between, e.g., *race the clock*, and in the other, as verb and noun combinations with optionally up to two words in between, e.g., *race against the clock*. While the result of the first search pattern showed that the targeted collocations were frequently used in the ukWaC, i.e., more than 50 times, the second search pattern included the first search pattern, and so the frequency numbers of the searched collocations were correspondingly higher. Moreover, close examination of the outcome of this second search pattern in the corpus showed that this pattern gave comparably reliable results in finding the targeted collocations. In other words, the potentiality of both search patterns in identifying

the targeted collocation was good, but the second search pattern was superior in generating more examples and consequently more distributional information. Therefore, it was decided to calculate the vectors for the collocations based on both search patterns.

For each search pattern, three different distributional measures were investigated. Two related to the semantic similarity of each collocation to each of its two component words individually, while the third measured the semantic similarity of one component word to the other. In total, the program looked for five meaning vectors: (1) the similarity between the verb and collocation with optionally one intervening word; (2) the similarity between the verb and collocation with optionally two intervening words; (3) the similarity between the noun and collocation with optionally one intervening word; (4) the similarity between the verb and collocation with optionally two intervening words; and (5) the similarity between the noun and the verb of the collocation. When calculating the vectors for the component words, the contexts containing the collocation were excluded. This meant that the vectors for each verb as well as each noun were calculated only from contexts where each component word appeared alone, but not from contexts where they appeared close to the other component word. This way, the independent contribution of each of the two component words in determining the meaning of the targeted collocation was maximized. Following Reddy, McCarthy and Manandhar (2011), and as suggested by Katz and Giesbrecht (2006), these five measures were considered possible estimates of semantic transparency. Therefore, their feasibility as measurements of semantic transparency of the targeted collocations was the object of investigation in this study.

5.5.2 Statistical analysis

The purpose of the analysis was to find out if all or any of the five distribution-based measures could be used as estimates of the semantic transparency of the targeted collocations. More specifically, it aimed to investigate whether distributional measures, based on previous

computational work with compounds, correlated with the human transparency ratings of collocation items, in order to explore whether these measures could be used as an alternative reliable method, besides human ratings, in establishing the relative semantic transparency of the collocation items. SPSS software was used to conduct descriptive and correlational analysis of the data. This involved looking at the distribution of the data for each similarity measure, which was graphically represented, in addition to drawing scatter plots and running correlation tests in order to examine whether the tested distributional measure correlated with the human transparency ratings of the targeted collocations. As the data is not normally distributed, Spearman's tests were mainly used to calculate the correlation coefficients. The results of the analysis are reported in the next section.

5.6 Results of computational measuring of semantic transparency

5.6.1 Distribution of computational measures

In order to examine whether all or any of the five investigated distributional measures show/s a good distribution pattern suggesting its/their feasibility as measures of transparency ratings, Table 5.4 and the box and the whisker plots in Figure 5.11 were produced. These illustrate the distribution of values for each of the five investigated distributional measures. Table 5.4 includes two additional columns showing the frequency of each collocation in the ukWaC corpus. The displayed corpus frequency is based on both the first and second search patterns described above. (The first search pattern is hereafter referred to by (1) while the second search is represented by (2) for ease of reference.)

Visual comparison of the box plots (Figure 5.11) drawn for each distributional-based measure clearly illustrates that the verb-noun similarity measure has greater variability and more evenly distributed values compared to the other four measures. The values for all four collocation-constituent similarity measures based on search patterns (1) or (2) instantiate a decrease in variability and skewness to the right. None of these four distribution-based

measures have values that exceed (0.34) as the maximum value, which is close to the median (0.36) of the verb-noun similarity measure. The two left box plots and two right box plots display one of the four collocation-constituent similarity measures, each of which clearly shows evidence of four outliers. *Overcome a barrier* and *impose a penalty* were two outliers present in the boxplots of all four measures. The verb-collocation similarity measures have the collocations *celebrate a wedding* and *approve a recommendation* as two additional outliers, whereas the noun-collocation measures have *adapted a recipe* and *bury waste* as two further outliers. These outliers all lie above the main boxes in the box plots, which indicates slightly higher values, hence greater distributional similarity, which it is hypothesized indicates a greater degree of transparency. In comparison, most values for these four measures reflect a very narrow range of transparency. The overall range as well as the interquartile range of the data for the two noun-collocation similarity measures were a little greater (indicating more variation) than those for the two verb-collocation measures. Overall, the noun-verb similarity shows a more even distribution than any of the other measures investigated here. This greater spread or range makes it a potentially more useful measure to compare with human ratings in order to determine its feasibility in predicting human ratings and later collocation learnability, as discussed in the next chapter.

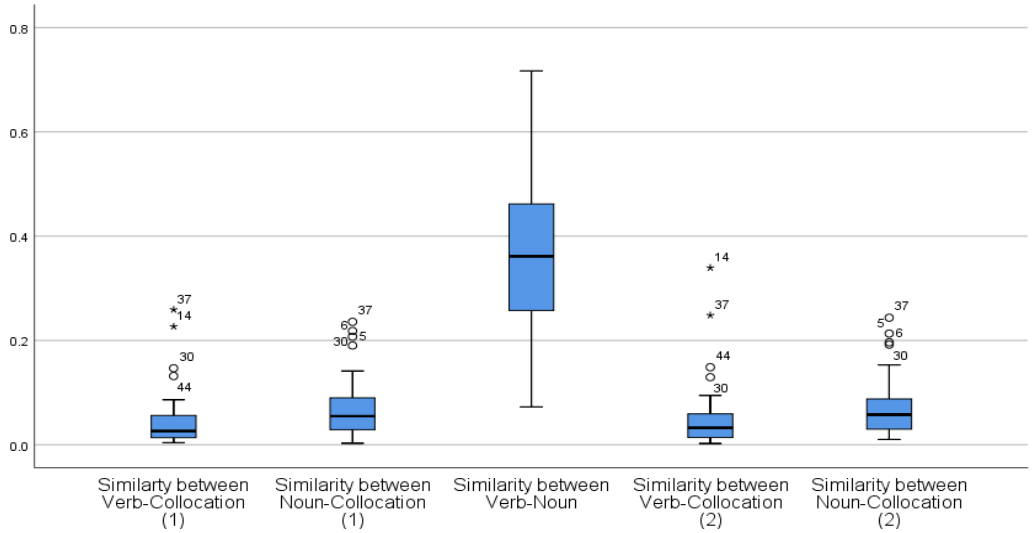


Figure 5.11: Box plots for each type of the five distributional measures

Table 5.4: Five semantic similarity measures obtained for the 44 collocations, listed in descending order of verb-noun similarity measure[19]

Item No.	Collocation	Similarity between Verb-Collocation (1)	Similarity between Noun-Collocation (1)	Similarity between Verb-Noun	Similarity between Verb-Collocation (2)	Similarity between Noun-Collocation (2)	Combination Frequency (1)	Combination Frequency (2)
1	resist infection	0.0060	0.0759	0.0726	0.0056	0.0703	83	91
2	display emotion	0.0062	0.0029	0.1009	0.0072	0.0436	84	118
3	plant a flag	0.0046	0.0122	0.1058	0.0040	0.0106	52	69
4	arrest the decline	0.0080	0.0187	0.1399	0.0072	0.0171	134	149
5	adapt a recipe	0.0440	0.1903	0.1475	0.0443	0.2132	62	66
6	bury waste	0.0380	0.2072	0.1620	0.0361	0.1964	128	152
7	race the clock	0.0040	0.0177	0.1731	0.0025	0.0102	12	54
8	exercise the imagination	0.0083	0.0380	0.1943	0.0072	0.0319	72	87
9	distribute electricity	0.0245	0.0597	0.2012	0.0312	0.0589	111	126
10	contact the manufacturer	0.0195	0.0813	0.2132	0.0197	0.0810	354	481
11	dismiss a suggestion	0.0053	0.0243	0.2502	0.0052	0.0236	215	221
12	cast a reflection	0.0058	0.0291	0.2646	0.0056	0.0269	59	65
13	rule the universe	0.0195	0.0254	0.2678	0.0182	0.0237	82	90
14	celebrate a wedding	0.2267	0.1042	0.2714	0.3394	0.1267	276	692
15	assess a personality	0.0238	0.0903	0.2879	0.0229	0.0846	71	80
16	practice a craft	0.0192	0.0176	0.2881	0.0171	0.0161	70	82
17	restore trust	0.0242	0.0476	0.3119	0.0274	0.0510	229	253
18	shape the curriculum	0.0094	0.0207	0.3165	0.0116	0.0290	43	63
19	detect an error	0.0546	0.1132	0.3287	0.0671	0.1530	341	445
20	implement a treaty	0.0280	0.0164	0.3310	0.0284	0.0184	42	57
21	vary the height	0.0519	0.0777	0.3342	0.0521	0.0755	292	332
22	possess (a) talent	0.0201	0.0272	0.3390	0.0179	0.0238	56	105
23	accompany an exhibition	0.0590	0.1360	0.3839	0.0579	0.1424	522	620
24	deserve an award	0.0349	0.0792	0.3865	0.0335	0.0753	459	502
25	enable the viewer	0.0353	0.0738	0.3965	0.0350	0.0775	349	382

[19] The frequency of the combination in the ukWaC (1) denotes when the collocations were defined in the search as verb and noun combinations with optionally one word in between, whereas (2) denotes when they were defined as verb and noun combinations with optionally two words in between.

26	translate a phrase	0.0832	0.0426	0.4010	0.0946	0.0431	72	104
27	monitor pollution	0.0730	0.1413	0.4077	0.0724	0.1320	126	153
28	yield an insight	0.0087	0.0321	0.4179	0.0068	0.0241	200	236
29	assign priority	0.0124	0.0385	0.4221	0.0135	0.0375	156	214
30	overcome a barrier	0.1467	0.2181	0.4325	0.1295	0.1919	2450	2856
31	permit entry	0.0238	0.0711	0.4433	0.0399	0.0822	204	233
32	enhance someone's reputation	0.0760	0.0892	0.4504	0.0751	0.0910	954	1129
33	inform selection	0.0436	0.0497	0.4592	0.0477	0.0566	83	116
34	balance a load	0.0518	0.0474	0.4645	0.0560	0.0526	79	147
35	accomplish an objective	0.0147	0.0477	0.4651	0.0138	0.0428	208	265
36	embrace diversity	0.0409	0.0825	0.4760	0.0386	0.0821	397	465
37	impose a penalty	0.2591	0.2356	0.4779	0.2483	0.2436	921	1226
38	process a request	0.0578	0.1212	0.4918	0.0666	0.1319	766	918
39	occupy territory	0.0863	0.0712	0.4993	0.0828	0.0726	153	239
40	assist recovery	0.0387	0.0287	0.5364	0.0404	0.0361	146	282
41	switch channel	0.0177	0.0484	0.5707	0.0211	0.0479	156	215
42	doubt the existence	0.0201	0.0337	0.6209	0.0191	0.0308	124	149
43	negotiate an arrangement	0.0671	0.0666	0.6334	0.0608	0.0676	186	289
44	approve a recommendation	0.1317	0.1359	0.7168	0.1486	0.1443	394	468

5.6.2 Relationship between human transparency measures and computational measures

To explore whether or not the five distributional measures correlated with the human transparency ratings obtained for the targeted collocations, five scatter plots were produced and correlation tests performed. Spearman's correlation was specifically used because the data was not normally distributed. The first two scatter plots below depict the relationship between the median human transparency ratings of the collocations and the verb-collocation similarity measures calculated with either optionally one intervening word (1) (Figure 5.12) or optionally two intervening words (2) (Figure 5.13). The correlation was found to be statistically significant for both similarity measures ($p < 0.05$). However, the results of the computed Spearman's tests revealed that the correlation between the median human transparency ratings and the verb-collocation similarity measures was of a moderate degree.

This holds for both similarity measures between the verb and its corresponding collocation regardless of which type of search pattern was used. The correlation coefficient was ($r_s(42) = .57$, $p < .05$) for search pattern (1) and ($r_s(112) = .58$, $p < .05$) for search pattern (2), indicating that these two variables only moderately correlated with human transparency ratings.

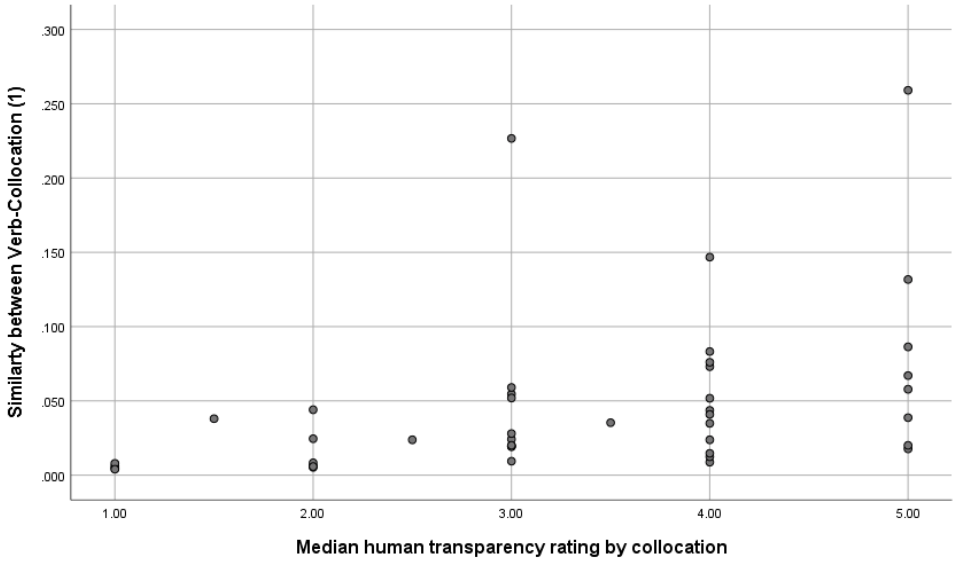


Figure 5.12: Scatter plot of median human transparency ratings of collocations against the verb-collocation similarity measures (1)

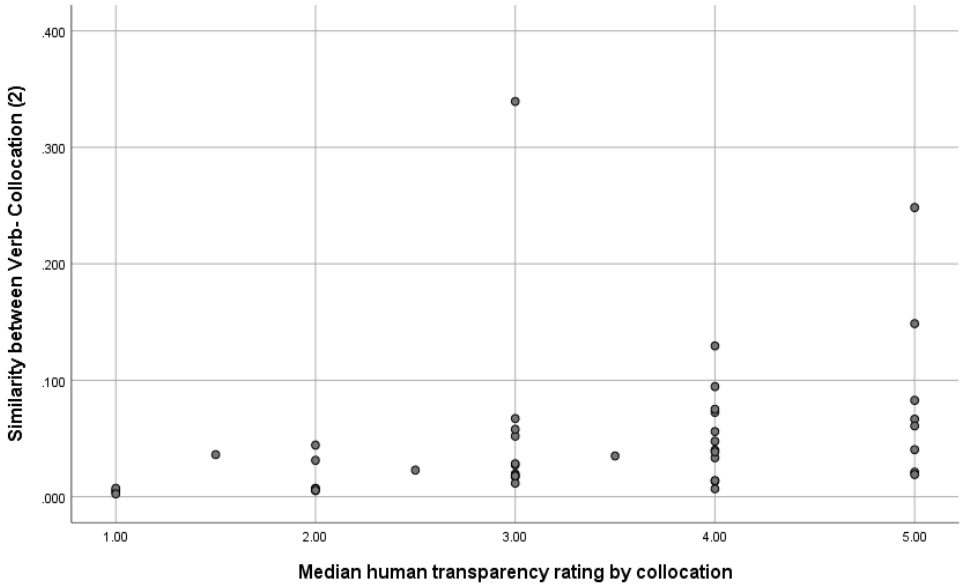


Figure 5.13: Scatter plot of median human transparency ratings of collocations against verb-collocation similarity measures (2)

Figures 5.14 and 5.15 illustrate the relationship between the median human transparency ratings of the collocations and the noun-collocation similarity measures with either one or two optionally intervening words respectively. Both scatter plots show that the observations are not very close to each other compared to the verb-collocation similarity measures. When Spearman's test was run, only a weak correlation was found between the median human transparency ratings and the noun-collocation similarity measures, as defined either in search pattern (1) or (2). The correlation coefficients were ($r_s(42) = .29$, $p < .05$) and ($r_s(42) = .28$, $p < .05$) respectively.

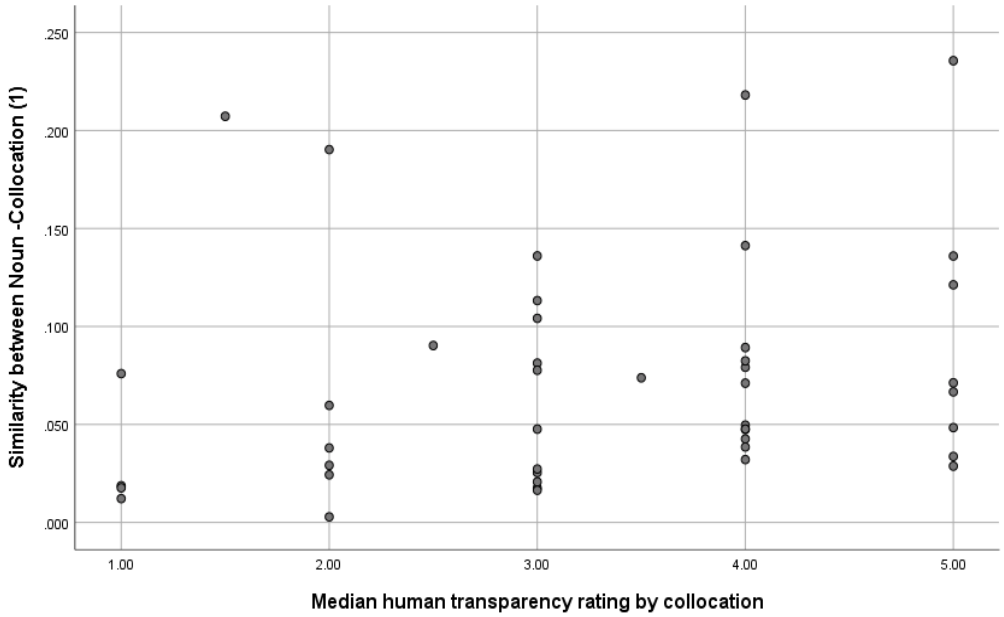


Figure 5.14: Scatter plot of median human transparency ratings of collocation against the noun-collocation similarity measures (1)

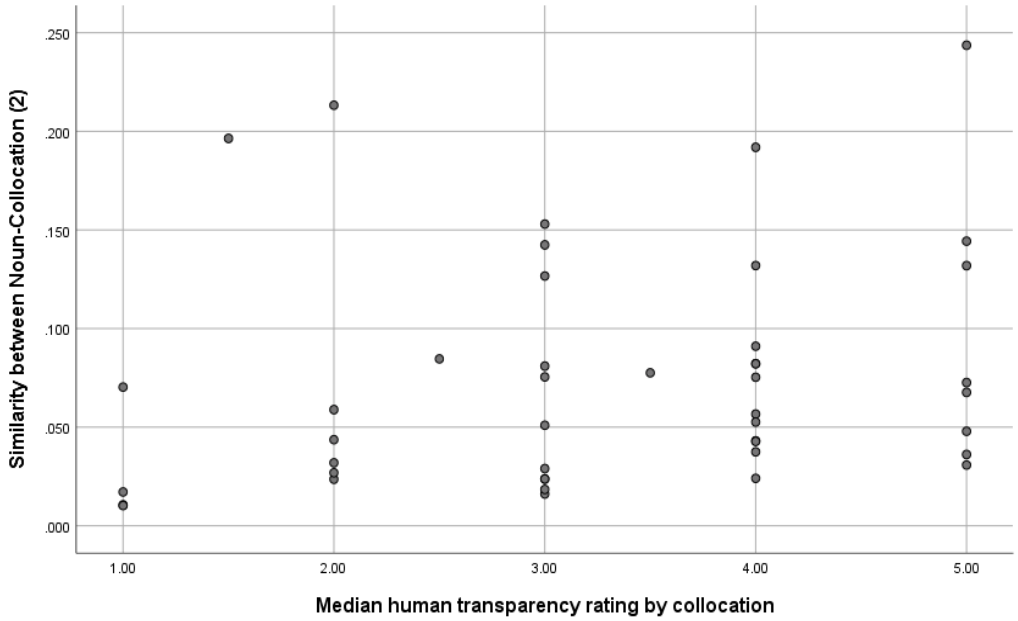


Figure 5.15: Scatter plot of median human transparency ratings of collocation against the noun-collocation similarity measures (2)

The results from the verb-noun similarity measures were markedly different from the results obtained by comparing the distribution of either constituent with the collocation as a whole. The scatter plot in Figure 5.16 illustrates a positive linear association between the median human transparency rating of the 44 collocations and the verb-noun similarity measures. When the strength of this relationship was calculated with Spearman's correlation test, it clearly indicated a very strong correlation with a coefficient of ($r_s(42) = .96$, $p < .001$). This correlation was statistically significant ($p < .001$), which is above the significance threshold that has been adopted in this research (set at .05). Moreover, all of the observations appear to fall very close to each other, showing this particular measure to be very strongly correlating with human transparency ratings.

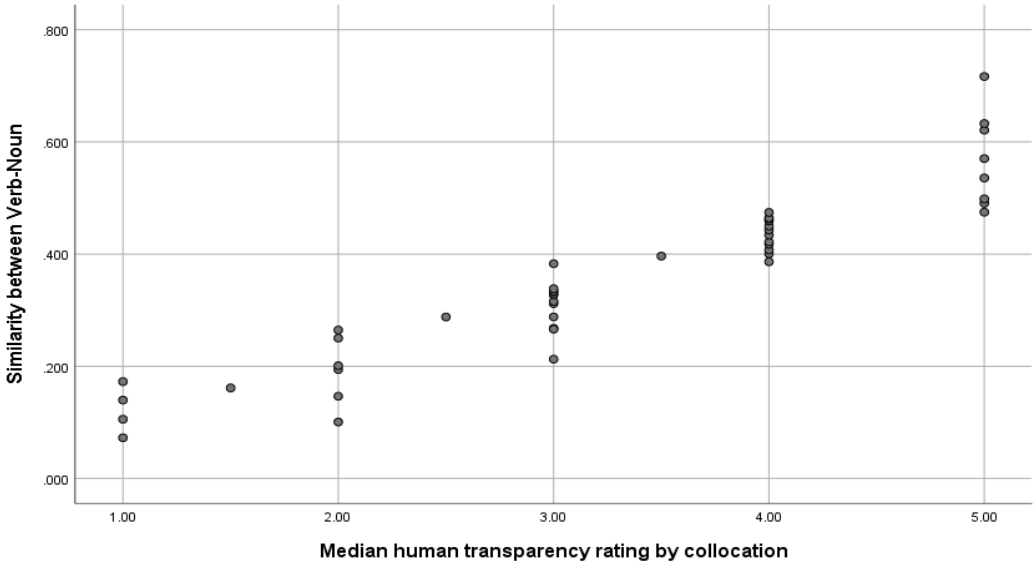


Figure 5.16: Scatter plot of median human transparency rating of collocation against verb-noun similarity measures

In summary, the results of the above analysis have revealed only a moderate relationship between the median human transparency rating and the verb-collocation similarity measures for both search patterns (1) and (2). They also displayed an even weaker association between human transparency ratings and the noun-collocation similarity measures for both search patterns. However, the verb-noun similarity measures demonstrated a significant strong correlation with the median human transparency ratings of the 44 targeted collocations. This suggests that the distributional similarity between the verb and noun of the collocation can be considered the strongest correlating measure to human transparency ratings, better than the other four measures. Part of the reason why this is the case could be related to its more even distribution and wider range of values compared to the other four measures (see Figure 5.11 above).

5.7 Discussion

The primary aim of this chapter has been to investigate whether a hierarchy of semantic transparency can be established for the 44 targeted collocations, which were selected based

on a combination of the frequency- and phraseological-oriented approaches. The use of this unified approach to collocation identification was intended to bring out the best candidate collocational items that could be exploited to accomplish the objective of this thesis, i.e. to test whether semantic transparency *per se* affects learnability, independently of L1-L2 congruency and learners' prior knowledge of the constituent words. The methodology of the selection of the collocation items was rigorously executed in terms of the carefully taken measures to control for potential affecting variables such as frequency and grammatical structure, in addition to variables specifically related to the targeted L2 learners in this study (in the main intervention phase) such as L1-L2 congruency and age-appropriate suitability. The selection of the collocations also involved making certain that the candidate collocations reflected a good range of semantic transparency. To meet this end, this chapter has been devoted to ranking collocations in terms of their degree of semantic transparency using reliable methods, thereby overcoming a gap in previous studies (such as Webb, Newton and Chang, 2013) which mainly relied on the frequency-based approach to identify items, leading to the inclusion of collocations which may indeed have varied in their semantic transparency levels but whose transparency levels were not known or clearly and reliably ranked.

The chapter has also examined the feasibility of two methods, human transparency ratings and distribution-based measures, in determining a ranking of semantic transparency for the selected collocations. The use of two measures of semantic transparency was intended as a methodological triangulation strategy to increase the reliability and validity of the results. This is especially important because the influence of semantic transparency is the central independent variable investigated in this thesis. The use of human transparency ratings is considered in the literature to be one of the most reliable methods used to evaluate the degree of semantic transparency of different types of multiword units (Reddy, McCarthy and Manandhar, 2011), whereas, in comparison to human ratings, distributional measures offer

the advantage of automaticity and speed in measuring sizable sets of word combinations. The analysis has demonstrated that both methods were successful in revealing a continuum of semantic transparency of the collocation items and thus served as a good means to determine the relative degree of semantic transparency of collocations here and in general.

An important outcome of the analysis of the results in this chapter pertains to the strong, significant correlation found between human transparency ratings and the distribution-based measures. This lends strong support to previous multiword research, for example, Reddy, McCarthy and Manandhar (2011) and Wang et al. (2014), in which distributional semantic based measures were found to be a strong predictor of human transparency ratings. However, the strength of the correlation in this study was extremely high ($r_s(42) = .96$, $p < .001$), surpassing the aforementioned studies (the highest Spearman correlation scores in these studies were $r_s = 0.71$ and $r_s = 0.53$ respectively). It is quite an interesting finding that the selected collocations really did exhibit a range of semantic transparency to which human participants were sensitive, and these differences in the relative semantic transparency were also reflected in the distributional semantics or the way words are used in combination with other words in the language generally.

In this study, five types of distributional-based semantic similarity measures were tested to explore their potentiality as estimates of the semantic transparency of verb + noun collocations. The first and second types were those between either the verb or the noun and their corresponding collocation, computed with one optionally intervening word; the third and fourth types were those between either the verb or the noun and their corresponding collocation, computed with two optionally intervening words; the fifth type was the distributional similarity between the verb and the noun. Of these five investigated measures, the semantic similarity measures between the verb and noun in particular were shown to strongly correlate with human transparency judgments, suggesting this distributional measure

seems the best computational predictor of human transparency ranking of two-word collocations. This measure shows that the higher the semantic similarity between a verb and noun, the greater the degree of semantic transparency of a collocation composed of these two component words. Accordingly, it can be suggested that, when the two words in a verb + noun collocation are distributionally similar, their combination results in a semantically transparent construction. In contrast, when the semantic distribution of these two words is dissimilar, their combination as a collocation has lower semantic transparency. Therefore, verb-noun similarity measures can be considered a relatively reliable approximation of human transparency ratings of the semantic transparency of verb-noun collocations, which are taken here as the 'gold standard.'

The correlation analysis of the human ratings has also shown strongly significant correlations between the ratings for nouns, verbs and collocations, which has significant implications both for showing rater agreement as well as the identification of the part of the collocation unit which carries the most meaning. The high correlation suggests that there was a strong agreement between the raters in their rating of different aspects of each collocation, as whenever a collocation was rated as more or less transparent, both its verb and its noun were rated similarly. In addition, the strong correlation between the different elements of the verb + noun collocations shows that both elements, viz, the verb and the noun, contribute to the semantic transparency of the collocation. This evidence contradicts a claim of some researchers who argue that the verb component word offers relatively little contribution to the meaning of the whole verb + noun collocation and that it is the noun that often carries most of the semantic weight of this construction (e.g., Boers et al., 2014; Peters, 2015). This claim has not been empirically supported by the results presented in this chapter; as can be seen from the analysis of both human ratings and the distributional (verb-noun) similarity measures, it is not only the noun constituent that carries the semantic weight of the whole

collocation. Rather, both the verb and the noun contribute to the meaning of the whole construction, though not necessarily equally.

The results of both the distributional analysis and the human ratings revealed that the 44 collocations do represent a range of semantic transparency. However, the results demonstrated that most ratings of the targeted collocations were towards the more transparent end of the rating scale. It is possible that this estimation of collocations as relatively transparent word combinations is specific to the set of collocations selected for this study. However, another possibility is that collocations in general are more transparent compared to other multiword expressions in English, such as compounds or idioms. Macis and Schmitt (2017b) provide supporting evidence for this interpretation, who, in their analysis of a small set of 54 collocations, found that the majority of their sample appeared to be relatively semantically transparent, with only about 22% of their set having relatively less transparent meanings.

Despite the ratings being overall skewed towards greater transparency, some of the items selected for the present study were perceived by the raters as low in their degree of transparency. The less transparent collocations may reflect a meaning that is not simply the sum of the meanings of their constituents but rather a holistic meaning that transcends the added-up meaning of the two component words. Qualitative inspection of the comments provided optionally by some of the raters who participated in the semantic transparency rating of the targeted collocations in this study clearly illustrates this. One rater thought that the meaning of the component word *flag* had somehow shifted when used in the collocation *plant the flag*, leading to less transparency in meaning of the whole collocation. His exact comment was as follows: "*Meaning varies from a physical object to an abstraction meaning a 'state of influence.*' *This would be challenging – a flag not always a physical object.*" According to another rater, the lower semantic transparency of this collocation, i.e., *plant the*

flag, is more related to the non-literal meaning of its component word *plant*. He remarked as follows: "*Planting a flag is a common idiom for native speakers, but I suspect that the word 'plant' would create a confusing image in the mind of a new learner. When used idiomatically or as a figurative meaning, it can be a perplexing thought.*" In addition, the comment of a different rater regarding the meaning of the less transparent collocation *race the clock* is another example illustrating that the meaning of a collocation can be complex, beyond the simple adding of the core meanings of its component words: "*Race the Clock' would be hard for someone to interpret – because it isn't actually a race, and how does one race against a clock when it is an object that cannot move? It is actually racing against time.*" In stark opposition to the above examples, the meaning of a more transparent collocation, *translate a phrase*, was viewed as "very transparent" by one rater. Similarly, the collocations *approve a recommendation* and *detect an error* were perceived as "easy to get" and "straightforward" respectively by two different commenters. These comments by native-speaker raters exemplify how the reduced semantic transparency of some collocations reflects a complex meaning of the collocation at a holistic level, one which is broader than the simple addition of the core meanings of its component words, in order to arrive at an accurate interpretation. However, this might not be an easy task for L2 learners, if, as claimed by Wray (2002), they tend to segment and assemble the words of multiword combinations individually and not holistically like L1 speakers.

Several predictions can be made based on the evidence found in this chapter. The variation in the semantic transparency of collocations that is revealed here is expected to have an effect on their learnability by L2 learners. Idiom studies, e.g., Liao and Fukuya (2004), suggest that the less transparent a collocation is, the more difficult it will be for L2 learners to learn. Therefore, the collocations here that were ranked as less transparent (e.g., *race the clock*) would be expected to cause confusion and interpretation problems more than

transparent ones (e.g., *accompany an exhibition*), and even less problematic would be those which are greater in their relative semantic transparency (e.g., *negotiate an arrangement*). In addition, research evidence which has demonstrated L2 learners' tendency to avoid the use of idiomatic formulaic sequences (e.g., Kellerman, 1978; Laufer, 2000) leads to the prediction that less transparent collocations would be more difficult to produce. This is because transparent collocations can be produced by adding the two component words whose sum of basic meaning reflects the exact whole meaning of the collocation, whereas, in order to produce less transparent collocations, L2 learners have to learn the separate meanings of each of the collocation component words and the additional meaning of the whole collocation. This might lead to a learning burden that could make producing such collocations more challenging.

Overall, based on the empirical evidence reviewed in Chapter 3 (Section 3.4.4), it is hypothesised that the relative semantic transparency of collocations will play a significant role in L2 learnability from both comprehension and production standpoints. However, the impact of transparency is expected to be more prominent in the production of collocations as strong evidence in the literature (e.g., Torabian et al., 2014) shows L2 collocation production in general lags behind comprehension. These predictions will be empirically tested in the following chapter.

6 Pedagogical Intervention

6.1 Introduction

This chapter describes a pedagogical intervention study in which a set of collocations, which were selected and ranked according to their degree of semantic transparency in the previous chapter, were explicitly taught to a group of L2 students. The essential goal of this study is to test the hypothesis that more transparent collocations will be easier to learn. It also seeks to gain insight into the impact of explicit teaching on supporting the learning of L2 collocations. Hence, this chapter sets out to answer the following primary question which guided this research:

- Does the degree of semantic transparency of English collocations affect their learnability by Saudi EFL learners in terms of both recognition and production when prior familiarity is controlled for?

The current study also addresses the additional question:

- How effective is the method of teaching used here (a five-week period of instruction) in promoting the acquisition of L2 collocations?

This chapter is organized as follows. It begins with an account of the rationale for the methodological approach of the study, followed by a detailed discussion of the methodology of data collection in several subsections. The first subsection (6.3) offers a description of the main setting of data collocation and an account of the sampling procedure of the participants, and includes the design and administration of two qualification tests. The second part of the methodology (6.4) describes the development of the teaching material and reports the teaching intervention. The third subsection of the methodology (6.5) explains the design and the administration of the main testing instruments. In the subsequent section (6.6), the results and analysis of the data collected from the intervention are addressed, including two separate

sections that focus on the analysis of the correlation between collocation learnability and semantic transparency as measured by human ratings and distributional measures. The final section of the chapter offers a discussion of the main findings.

6.2 Justification of methodological approach

As discussed in Chapter 3, collocations play a central role in helping learners achieve fluency in a second language but are often not successfully acquired, especially in terms of production. Furthermore, the review of pedagogical studies in Chapter 4 suggested that, while collocations can be successfully taught through explicit methods, they are less amenable than single words to implicit learning, especially in EFL contexts where exposure to L2 input is limited. However, classroom time is also limited in these contexts, and explicit teaching is time consuming. It is therefore important both to develop efficient methods for explicitly teaching collocations, and to be selective about which collocations are explicitly taught. The study reported in this chapter contributes to both these aims. Firstly, it tests the effectiveness of an explicit method for teaching collocations. Secondly, it contributes a deeper understanding of the factors that make L2 collocations more or less difficult to acquire, thus providing evidence on which selection of collocations for explicit instruction can be based.

The present study was motivated by the observation that only four previous studies have attempted to investigate the possible impact of the degree of semantic transparency of collocations on their learnability and that each of these studies suffered from some methodological flaws. Firstly, these studies did not properly control for potentially confounding variables such as previous knowledge of the collocations or their constituent words, or the L2 collocations' congruency or otherwise with the learners' first language. Secondly, they did not adequately measure the degree of semantic transparency of the collocations. Thirdly, none of the four previous studies involved a pedagogical intervention, although the literature suggests that ineffective instruction is one of the factors that negatively

influences the acquisition of L2 collocations. To address these gaps in the literature, it was necessary to carry out a pedagogical intervention study with a tightly controlled design.

Overcoming the problem of potentially confounding variables necessitated controlling for both the prior knowledge of the learners in this study and the L1-L2 congruency of the collocations they were taught. To address the first issue, I recruited only participant learners with no prior knowledge of either the targeted collocations or their component words (based on the results of their vocabulary assessment) to properly control for previous knowledge of the targeted collocations. To address the second issue, as described in Chapter 5, only collocations that were congruent with Arabic were included in the sample taught. It might be assumed that all congruent collocations could successfully be produced by learners simply using word-by-word translation. However, as discussed in Chapter 3, there is some psycholinguistic evidence that the L1 congruency effect is not just a question of translation but might result from congruent collocations being acquired earlier in the L2. Because the present study teaches only collocations that are previously unknown to the participants, any effect of age of acquisition is also effectively controlled for, and any effect of transparency that emerges in the study cannot be attributed to relative congruency or age of acquisition. Hence, although a correlation between degree of transparency and ease of acquisition will not in itself establish a causal relationship, the tight design of the study means that such a relationship is likely to be the most plausible explanation of any such correlation found.

Aiming for a tightly designed teaching intervention necessitated that the targeted learners should receive the same time of exposure to the new collocations and be taught with the same teaching approach. The approach adopted was based on the review of L2 vocabulary teaching studies presented in Chapter 4. Moreover, great care was taken to minimize variation in the effectiveness of the teaching approach and/or materials for different collocations (i.e., all students were taught by the same teacher with materials that were relatively equal in all

aspects). As shown in Chapters 3 and 4, most previous research on the acquisition of L2 collocations has been concerned with learners with higher proficiency from different backgrounds than those recruited here. Thus, this intervention is considered a useful addition to the collocation teaching literature as it focuses on low proficiency learners of English from an Arabic-speaking background who have rarely been the focus of collocation teaching interventions. Finally, in order to improve on previous studies in terms of the measurement of transparency, rigorously controlled human ratings were triangulated with computational measures, as described in Chapter 5.

In sum, this study attempts to address the limitations of previous work on collocation learning by conducting an experimental intervention that tightly controls extraneous variables and leaves relative semantic transparency as the strongest potentially influencing factor on learnability, thereby rendering the results more trustworthy. The study adopts a three-group pretest/treatment/post-test design, with quantitative analysis of the results. This approach was selected because it offers objectivity and makes the findings more likely to be generalizable to a larger population.

6.3 Methodology: the pre-teaching phase

6.3.1 Setting and participants

The participants in this study were 94 female Saudi students who were studying EFL at an intermediate school in Saudi Arabia. All participants were eighth-graders, aged 14 and 15. This particular group of learners was chosen because they were expected to have a low level of vocabulary knowledge in general; hence the targeted collocations would be unfamiliar to them prior to the intervention. The participants had received four years of formal English instruction (three hours per week) at the time of data collection. The English textbooks that they had been studying for the previous four years are intended for beginner learners and correspond to Common European Framework of Reference for Languages (CEFRL) levels

A1 and A2. Only students with Arabic L1 were recruited to participate in this study in order to control for L1 transfer influence (as evidenced by Nesselhauf, 2005). In addition, all participants were at a pre-intermediate (A2) level of English proficiency, based on their scores on a vocabulary level test, described in detail in Section 6.3.2. Besides their language proficiency measure, only those who passed a prior word familiarity test (Section 6.3.3) were qualified to participate in the study. At the beginning of the recruitment, 137 students voluntarily took both the vocabulary level test and the familiarity test, only 94 of whom passed the qualification tests. These 94 students were randomly assigned to three classes: Class 1 (n=31); Class 2 (n=31); and Class 3 (n=32).

The main setting for data collection during the pedagogical intervention was a public intermediate school in Riyadh, Saudi Arabia. As the researcher was financially supported by the Ministry of Education in Saudi Arabia, easy access to the school, as well as administrative cooperation, was consequently gained. This intermediate school was female-only, as the public education system in Saudi Arabia is single-gender education. This factor was convenient in one respect for the present research as it controlled the effect of gender difference. English as a Foreign Language is a mandatory subject taught to all Saudi students from grade four, in which American English is the most widely used variety of English in public education as well as outside school. The data was collected towards the end of the academic year, during the 45-minute period five days a week allocated for extracurricular activities such as English language development. It was thought more appropriate to conduct the experimental intervention with students who had selected the development of their English language ability as their extracurricular course as they would be considered highly motivated to participate in an intervention that targeted the teaching of English collocations.

The study was reviewed and approved by the Faculty Research Ethics Panel at Anglia Ruskin University before the start of the data collection and was deemed to be a study of

minimal risk to participants. All participants understood the nature of the study and were informed at the onset that their participation was voluntary. They were provided with a Participant Information Sheet and a Participant Consent Form to fill out before they were recruited (a copy of both forms can be found in Appendix D). Every effort was made to ensure that the confidentiality of the data collected and the anonymity of the participants was maintained at all times. As the instruction intervention involved student participants younger than 18 years old, the researcher was required to obtain a Disclosure and Barring Service certificate and pass a safeguarding online course before the conduction of the study. Furthermore, it was necessary to obtain the consent of the student participants' parents prior to their participation. Finally, permissions from both the Ministry of Education in Saudi Arabia and the school where the intervention took place were gained before data collection began.

6.3.2 Assessing lexical proficiency level

This study strove to adequately control learners' prior knowledge of the targeted collocation before their learning was tested. One way this was accomplished was by exclusively targeting beginner learners who were expected to have a zero-word knowledge of the experimental items. As mentioned above, based on their formal English instruction, eighth-graders were considered good candidates as participant learners, whose linguistic proficiency was at a high beginner level. As an extra precautionary measure, these learners' vocabulary knowledge was assessed before they were identified as suitable participants in this study. A modified version of Schmitt, Schmitt, and Clapham's (2001) Vocabulary Levels Test (VLT) was the tool used to measure the learners' English language proficiency level. This test is considered one of the most widely used tests to measure L2 learners' word knowledge, indicating the word frequency levels that are appropriate for learning at their level. The VLT was originally developed by Nation (1983, 1990) and later updated by

Schmitt, Schmitt, and Clapham (2001), who revised the VLT in two new versions, Version 1 (V1) and Version 2 (V2), and in a validation study found these versions to be relatively equivalent and highly validated instruments of L2 learners' vocabulary size.

Both versions of the VLT contain five parts. Each of the first four parts is related to a different word frequency level (2,000, 3,000, 5,000, 10,000), and the fifth is an academic vocabulary level. Each part consists of 30 items, clustered in 10 groups. In each group, three words and three distracters are listed in a left-hand column that need to be matched with three corresponding definitions of these words in a right-hand column. This format of matching words with their definitions targets meaning recognition. The following is an example from the VLT for illustration:

l	business	
2	book	___*6*__ part of a house
3	horse	___*3*__ animal with four legs
4	pencil	___*4*__ something used for writing
5	shoe	
6	wall	

The VLT is considered a diagnostic test that can give a profile of a learner's vocabulary knowledge level. Learners can take the entire test with all of its five parts or just one or two levels as necessary. This is because what is considered of value is not the total score of the entire test but the score for each level. A score of 26/30 or higher is seen as indicative of mastery at each frequency-based level. Therefore, advanced learners would need to be tested only on frequency levels such as the 5,000 or 10,000 levels, but not the 2,000 or 3,000 levels which they will be assumed to have mastered. In contrast, it is not useful to assess beginner learners' word knowledge of higher frequency levels such as the 5,000 or 10,000 levels, as their knowledge is not expected to exceed the 2,000 or 3,000 frequency levels.

Since the targeted students in the present study needed to have a vocabulary knowledge of about the 2,000 level, only the 2,000 and 3,000 levels were used. For students to be qualified as participants, they needed to show mastery of the 2,000 level by scoring 26/30 or higher at this particular level of the test. In addition, their vocabulary knowledge had to be under the 3,000-word frequency level by them scoring less than a passing score at this level, which is less than 26/30. The adapted modified version of the VLT in this study consists of a combination of V1 (the 2,000-word level) and V2 (the 3,000-word level) versions of the test. The reason for not taking both word-level parts from one original version of the vocabulary test was because included in one level of each version separately (viz, V1 and V2) some items that were actually component words of the targeted collocations, selected for the intervention phase, and adopting either version of the test without any change would entail exposing the learners to some of the component words before the others in advance of the intervention. Therefore, the 3,000-word level of V1 had to be discarded because it contained two of the selected experimental items in this study: *assist* and *phrase*. The 2,000-word level in V2 had to be replaced with the 2,000-word level in V1 because it included the word *arrange*, which is the verb form of *arrangement*, and one of the targeted experimental items (a sample of the employed modified VLT can be seen in Appendix E). Of the136 participant students who sat this modified VLT, 123 students were able to achieve the passing score at the 2,000-word level and at the same time did not exceed the passing score at the 3,000-word level. Subsequently, these students were qualified to take the prior word familiarity test described in the next section.

6.3.3 Controlling for prior knowledge of the collocations

As controlling for prior knowledge of the targeted collocations was a prime objective of this study, some measures were taken to achieve this objective from the initial stages of data collection, i.e., during the selection of targeted collocations (see Chapter 5, Section 5.2.1). As

mentioned in Chapter 5, the selection of the candidate collocations was restricted to those whose constituent words have a frequency rank in the range of 2,000–4,000. This is because beginner learners, such as those recruited in this study, were expected to have L2 vocabularies of about 2,000 words, and therefore to be unfamiliar with words whose frequency rank was greater than 2,000. The frequency rank of the words was limited to under 4,000 because words below this level were expected to be one level above the participants' expected word knowledge level (see Chapter 5, Section 5.2.1).

As an additional and more trustworthy method of controlling for previous knowledge, prior familiarity with the component words of the collocations was assessed and only those participants who had no prior knowledge were qualified in the pedagogical intervention. This method ensured that all targeted collocations employed during the intervention were equally unknown to participants. A Word Familiarity Task was designed especially for this purpose in an attempt to overcome the shortcomings of the methods of controlling prior knowledge in previous studies. This Word Familiarity Task was intended to test learners' familiarity with the constituent words of the targeted collocations. The rationale was if the learners did not know the constituent words, clearly they would not know the collocations either. In other words, the main purpose of this test was to ascertain that, at the onset of the intervention phase, not only would the collocations at phrasal level be unknown to participants, but all component words of these collocations would also be unknown. In this way, all learning gains or lack thereof that might be observed could be attributed to the intervention, including the possible effect of semantic transparency.

The Word Familiarity Task consisted of a guideline page and a rating task (see Appendix F for a sample of this task). It asked the participants to rate their familiarity with each of the 90 individual words that comprise the original set of candidate collocations (as each collocation of the 44 collocations consisted of two component words). A four-point Likert

scale (1: Know very well–4: Do not know at all) was used in the task. More specifically, judgment of the familiarity of the words was based on the following criteria:

1. (Know very well): "*You know the word very well and you are sure that you know the meaning of the word*";
2. (Have seen/heard it but not very sure about its meaning): "*You have seen / heard the word before but you are not certain that the meaning you know is correct*";
3. (May have seen/heard it but do not know its meaning): "*You think you have seen / heard the word before, but you don't know the meaning of the word*";
4. (Do not know at all): "*You have never seen / heard the word before*".

The task also allowed the student participants to write the meaning of any known words, either in English or in Arabic, as an extra measure to determine their exact understanding of the words' senses which they had rated as known.

This Word Familiarity test was piloted to evaluate its reliability before its administration to a class of 32 students. The number of students in this pilot class was equal to those recruited during the intervention (viz, three classes: two classes of 31 students; and one class of 32 students). The students in the pilot study were also from the same school selected for the main study. However, they were seventh- and ninth-graders, as most of the volunteering eighth-graders had been reserved as potential participants in the main study. The participants were provided with a questionnaire adopted from Gyllstad (2009) (see Appendix G) to elicit their perceptions of the quality of the task. Their feedback related to how they perceived the task in terms of (1) clarity of instructions, (2) level of difficulty, and (3) overall appeal. The feedback was generally positive. One of the suggested improvements was to enhance the task format by changing the layout of the instructions to make them clearer, which was implemented before administering the task to the participants in the main study.

As mentioned above, participation in this study was restricted to those with no prior knowledge of the component words of the collocations. Thus, only when a learner rated all

items in the test as (4), i.e., *Do not know at all*, was he/she deemed to have passed this test. It was decided that if any learner showed any level of familiarity to any item, i.e., rated an item as (1), (2) or (3), either this learner was to be eliminated or this particular item was to be excluded in those cases when many other learners were also found to display familiarity with it. One hundred and twenty-three participant students took the Word Familiarity test on the day before the start of the intervention. They were told that this test would assess their knowledge of a set of words to evaluate their general vocabulary knowledge. This was to limit the possibility that some participants might learn these words before the start of the intervention. Based on the results of this familiarity test, only 94 students rated all the listed words as unfamiliar, except for one word: *sentence*. Because most of the participant students showed some familiarity with one of the meanings of the word *sentence*, therefore, this particular word and its collocating verb *appeal* (comprising the collocation *appeal a sentence*) were excluded from the list of 45 candidate collocations. Consequently, these 45 experimental items (whose semantic transparency was established in Chapter 5) were reduced to 44 collocations and were the main targeted items during the teaching intervention.

It is worth noting that four students, other than the 94 qualified participants, who were each familiar with one word on this test were initially included on the qualified participants list (the number of participants at the beginning of the experiment was 98 in total). The words with which these four students were familiar were *channel*, *clock*, *shape* (as a noun) and *exercise* (as a noun). It was intended to exclude these four participants' results for each of their known items during data analysis. However, the participants had to be withdrawn (at the request of the school administration) during the first two weeks of the intervention period because they were needed for another school-related activity.

6.4 Methodology: the teaching phase

6.4.1 Materials design

Before the beginning of the teaching intervention, instructional materials for the 44 targeted collocations were carefully designed. *The Word Explorer Children's Dictionary* (Parks, 2021) (see Chapter 5) was selected as the main resource for developing the teaching materials. The rationale for relying on this dictionary was that it was age-appropriate for the targeted students who were aged 14 or 15, as well as linguistically suitable for learners with low proficiency levels such as those participating in this study. It is a unique and thoughtfully written freely accessible online dictionary, offering for each entry word only the most common and important definitions, which are presented in an uncomplicated style. It also provides further useful tools, such as a Glossary and Quiz makers. In addition, it includes easy to understand example sentences for each entry word. The features of this dictionary can support a teacher in developing activities such as multiple choice, matching and gap-filling exercises, while customizing these activities as required. The dictionary was exclusively relied upon to teach the different senses available for each constituent word of the targeted collocations. The number of definitions adopted from it for each constituent word of the 44 collocations ranged from one to seven. Moreover, most of the training activities used in the teaching phase were created with the aid of the tools that are also available on this dictionary's website.

The design of teaching materials for the targeted collocations (as opposed to the constituent words) was mainly accomplished by adapting a number of context sentences from the Ludwig.guru website (2014–2021), https://ludwig.guru/about, which presents high-quality context sentences taken from reliable sources[20] for any English word or expression. In

[20] Ludwig provide more than 120 million sentences taken from sources of English writing such as established newspapers, scientific journals and official documents.

addition, some simpler in-language sentences found by a Google search were adopted as context sentences on the extremely rare occasions where suitable sentences could not be found on the Ludwig website. Some activities that involved translating the meanings of collocations into Arabic were created by the researcher. It was imperative to ascertain that all the language used in the designed materials consisted of high-frequency words, as these were more likely to be familiar to the targeted students. This involved checking the frequency of all words that were suspected to be unfamiliar to the targeted learners against the COCA frequency ranked list (discussed in Chapter 5). In addition, restricting the sources of the developed materials to those which were age-appropriate to the targeted students, i.e., mainly from *The Word Explorer Children's Dictionary* and appropriate examples from the Ludwig website, ensured as far as possible that the training materials were all at comparable levels of complexity.

It is also worth mentioning the decision about which of the targeted collocations should include an article and which article that would be in each case. This is especially important because CONTRIX, the main productive collocation-testing tool (described below), required the students to make a decision about the appropriate article. In addition, COLLMATCH, the main collocation-recognition testing instrument (also described below), included articles in the tested collocations. Therefore, every collocation was checked in COCA to find which collocations usually include an intervening article and which do not. In the former case, a check was made as to whether this more frequently appears as a definite or indefinite article. The most frequently occurring pattern of each collocation was taken as the adopted structure for both teaching and testing phases (see Chapter 5, Section 5.2.2). Likewise, a decision had to be made with regards to which collocations frequently appear with a singular, plural or uncountable form of the noun, or more than one of these. On this basis, it was decided that all relevant forms of the nouns as normally found in English dictionaries, such as the one used

here in *The Word Explorer Children's Dictionary,* would be taught to students. For example, the noun *flag* in the targeted collocation *plant a flag* is countable, so students were taught both its singular form, *a flag*, and its plural form, *flags*. However, the noun *existence* in the collocation *doubt the existence* is uncountable and students were accordingly taught just one form.

6.4.2 Pattern of delivery

Explicit teaching was the method adopted in the teaching phase since it is considered one of the most fruitful methods used in collocation instruction, based on the literature reviewed in Chapter 4 (e.g., Laufer and Girsai, 2008; Webb and Kagimoto, 2009; Szudarski, 2012). The teaching method implemented in the present intervention drew upon evidence of previous vocabulary teaching studies with regards to the most effective practices to promote positive learning of collocations, such as tasks that focus on the learners' L1 or encourage the production of collocations as intact whole structures (these activities are described in more detail below). Moreover, the adopted teaching method involved integrating the four psychological principles proposed by Webb and Nation (2017) and supported by researchers such Liou and Chen (2018) as optimal conditions for successful vocabulary learning. These are *noticing*, *retrieval*, *varied encounters or use* and *elaboration* (see Chapter 4, Section 4.2.1 for more detail). Furthermore, since controlling the possible effect of the teaching method was an aim of the present research, it was necessary throughout the whole teaching intervention to make certain that the collocations were presented using the same method in comparable contexts and all received the same amount and kind of recycling.

Before the start of the intervention, both the developed teaching materials (described in the above section) as well as the adopted method for teaching the targeted collocations were piloted. One lesson, which included the use of a sample of the teaching materials, was piloted with the same group of 32 students who had participated in the piloting of the Word

Familiarity Task (see Section 6.3.3 above). The outcome of the pilot was very encouraging, during which were no observed problems with regard to the teaching materials. However, it appeared that the time allocated, a session of 45 minutes, was not sufficient to teach the meaning of eight new words (four collocations) as planned. Accordingly, it was decided that it would be better to reduce the number of the words taught to six per session (three collocations) during the teaching phase, describes in what follows.

As mentioned above, the instructional intervention phase involved the participation of 94 students with a pre-intermediate level of English proficiency, Arabic L1 and no previous knowledge of the experimental items. These students had to pass the VLT and Word Familiarity tests in order to qualify as participants in this study. They were randomly assigned to three classes in roughly equal numbers: two classes of 31 students; and one class of 32 students. All participants received a total of approximately five weeks of consecutive teaching sessions (45 minutes a day, five days a week) on the 44 target collocations. It was essential to ascertain that the teaching method employed was consistent and balanced between the different collocations. Thus, as a way to increase the control of the experimental intervention and make certain that all three classes received the same type of teaching, all classes were taught by the current researcher, who is an experienced EFL teacher (which was also done by Sonder (2017) in his pedagogical investigation of collocation learning). With the assistance of a language-teaching expert at Anglia Ruskin University, Ms. Amanda Bailey, the researcher made every effort to devise a consistent method to teach the 44 target collocations equally effectively. The following section describes in more detail the method used to teach the 44 target collocations during the teaching intervention and how the goal to teach these collocations in an equally effective manner was approached.

The learning of these targeted collocations was scaffolded by dividing the teaching into two phases. In the first phase, for the first three weeks (15 sessions), the collocations were

presented to the students and their constituent words were taught explicitly as single words. In the second phase, during the last two weeks (nine sessions), the collocations were also taught explicitly, but as two-word combinations. As shown in previous research, L2 learners need approximately five to seven repetitions to learn single words (e.g., Nation 1983; Tinkham 1993), whereas learning collocations of previously known words can occur after only two repetitions (Durrant and Schmitt, 2010). In light of this, and the results of the piloted lesson, 15 sessions for the individual word teaching phase (six words per day) and nine sessions for the whole collocation teaching phase (five collocations per day) were expected to be sufficient for their acquisition, taking into account the number of repetitions across the presentation and practice phases of the lessons. The teaching schedule of both the single words and collocations, as shown in Table 6.2 below, followed a randomly sorted presentation order, rather than being taught in ascending or descending order of transparency, to avoid the risk of the degree of presentation order being a potential confound.

All teaching sessions (both individual words and whole collocation sessions) began with a presentation stage (promoting the *noticing* condition), during which the contextualized target items were displayed on screen using PowerPoint slides and their definitions and usage explained. All targeted items (both as intact collocations and individual component words) were always presented in example context sentences with the target words in bold red font to increase their saliency to the students, a format which has been found to be highly effective in increasing lexis learning (e.g., Choi, 2017; Sonbul and Schmitt, 2013). Additionally, a picture was added which was judged to be appropriate to further illustrate the meaning of the context sentence. All context sentences used were comparable in terms of their level of complexity and suitability for the targeted learners' linguistic level (see Section 6.4.1).

The presentation stage was followed by a practicing stage (targeting the *retrieval, varied encounters or use and elaboration* conditions), during which the students completed multiple

choice and gap-filling exercises. These steps, viz, the presentation and practicing stages, were repeated for each taught item, in order to be consistent with regards to the teaching method employed and the kind and amount of recycling assigned for each targeted item. This can be clearly seen in the following representative lesson plan (Table 6.1) and the teaching /recycling schedule (Table 6.2).

Table 6.1: Representative lesson plan

Activity Name	Procedures	Teaching Materials/ Aids	Time Allocated
1. Warm-up:	1. Briefly introduce the lesson, pointing to the importance and omnipresence of collocations in language.	PPT (using Power Point slides)	3 minutes
2. Presentation stage: (Noticing)	1. Draw learners' attention to the targeted item embedded in an example sentence (highlighted in bolded red font). 2. Ask learners to guess the meaning of the targeted item and explain its meaning and usage. (Repeat step 2 for each item from today's list of targeted items.)	PPT	10 minutes
3. Presentation stage: (Noticing & Retrieval)	1. Introduce the meaning and usage of the target item, including an oral translation and explanation in Arabic. Provide extra example sentence/s containing the target item. 2. Direct learners' attention to whether the noun constituent of the targeted collocation is countable/uncountable and which article/zero article it usually appears with. (Repeat step 3 for each item from today's list of targeted items.)	PPT	10 minutes
4. Practicing stage: (Retrieval & varied encounters or use)	1. Distribute worksheets for multiple choice activity; provide feedback when activity has been completed. 2. Distribute worksheets for gap-filling task; provide feedback when activity has been completed.	In-class worksheets	15 minutes
5. Practicing stage: (Varied encounters or use, elaboration)	1. Encourage learners to make sentences using the target items taught in today's lesson. 2. Ask learners to read aloud their generated sentences to the whole class and receive oral feedback from their classmates and the teacher.	Oral feedback	5 minutes
Wrap-up	1. Check if learners have any questions about today's lesson.		2 minutes

Table 6.2: Teaching/ recycling schedule, which was in a randomly sorted order

Single Word Phase: Targeted items		Collocation Phase: Targeted items	
1st session	1. Distribute electricity 2. Assist recovery 3. Arrest the decline	1st session	1. Shape the curriculum 2. Race the clock 3. Embrace diversity 4. Practice a craft 5. Rule the universe
2nd session	1. Impose a penalty 2. Dismiss a suggestion 3. Negotiate an arrangement	2nd session	1. Enhance someone's reputation 2. Approve a recommendation 3. Plant a flag 4. Balance a load 5. Permit entry
3rd session	1. Inform selection 2. Assess a personality 3. Accomplish an objective	3rd session	1. Display emotion 2. Occupy territory 3. Contact the manufacturer 4. Resist infection 5. Monitor pollution
4th session	1. Bury waste 2. Assign priority 3. Celebrate a wedding	4th session	1. Overcome a barrier 2. Implement a treaty 3. Possess a talent 4. Exercise the imagination 5. Switch channel
5th session	1. Yield an insight 2. Restore trust 3. Cast a reflection	5th session	1. Vary the height 2. Accompany an exhibition 3. Detect an error 4. Doubt the existence 5. Adapt a recipe
6th session	1. Deserve an award 2. Translate a phrase 3. Enable the viewer	6th session	1. Process a request 2. Deserve an award 3. Translate a phrase 4. Enable the viewer 5. Yield an insight
7th session	1. Doubt the existence 2. Adapt a recipe 3. Process a request	7th session	1. Restore trust 2. Cast a reflection 3. Bury waste 4. Assign priority 5. Celebrate a wedding
8th session	1. Vary the height 2. Accompany an exhibition 3. Detect an error	8th session	1. Inform selection 2. Assess a personality 3. Accomplish an objective 4. Impose a penalty 5. Dismiss a suggestion
9th session	1. Possess a talent 2. Exercise the imagination 3. Switch channel	9th session	1. Negotiate an arrangement 2. Distribute electricity 3. Assist recovery 4. Arrest the decline
10th session	1. Monitor pollution 2. Overcome a barrier 2. Implement a treaty		
11th session	1. Occupy territory 2. Contact the manufacturer 3. Resist infection		
12th session	1. Balance a load 2. Permit entry 3. Display emotion		
13th session	1. Enhance someone's reputation 2. Approve a recommendation 3. Plant a flag		
14th session	1. Embrace diversity 2. Practice a craft 3. Rule the universe		
15th session	1. Shape the curriculum 2. Race the clock		

As mentioned above, the teaching phase consisted of two phases: the single word phase; and the collocation phase. In the teaching phase of individual words, six words, viz, three verbs and three nouns, which could be combined to form three target collocations, were randomly selected and taught to each class (as shown in Table 6.2 above). Although the focus was on learning the meaning and use of the individual words at this stage, they were nevertheless presented at the beginning of each lesson as part of the collocation to which they belonged in a sentence context that suited the target students' language level. This was to emphasize implicitly the associations between the words that made up the collocations. Furthemore, during the first phase, the students were taught the different senses for each word with the aid of *The Word Explorer Children's Dictionary* (Parks, 2021) (see Section 6.4.1 in this chapter and Chapter 5, Section 5.2.3), as well as their uses in different example context sentences. Figure 6.1 shows an example of the instructional materials used during the single words phase of the presentation stage (for the whole sample, see Appendix H). The lessons were presented using PowerPoint slides, which enabled me to have the targeted items appear first, in their sentential contexts, while their meanings appeared in the second step.

In addition, the students' attention was drawn to whether the nouns used were considered countable/uncountable. During the individual word teaching sessions, recycling opportunities were provided with the aid of gap-filling and multiple-choice activities (a sample of these exercises is provided in Appendix I), which incorporated the different meanings for each taught word. The students were also encouraged to make sentences using these newly taught words by the end of each lesson (see Figure 6.2 for two example activities used during the single word phase).

Exercise imagination

ex·er·cise

part of speech:	**verb**
definition 1:	*to put into practice or make use of.* *He failed to **exercise** his right to vote.*
definition 2:	*to do physical exercise or activity.* *I **exercise** in the gym every morning.* 

im·ag·i·na·tion

part of speech:	**noun**
definition 1:	*the act or power of the mind to form a thought, picture, or image of something or someone that is not present to the senses.* *She uses her **imagination** to write stories.*

Figure 6.1: Example of a teaching material used for the teaching of two words (*exercise* and *imagination*) during the single word teaching phase

(Activity 1) Instructions: Choose the best answer/word for each definition.

1- a return to a normal condition or to good health.

- ○ distribute
- ○ decline
- ○ assist
- ◉ recovery

(Activity 2) Instructions: Complete these sentences using the words on this list

●arrested ● assisted ● decline ● distributed ● electricity ● recovery

1. The supervisor _____ safety goggles to the workers.
2. The police _____ the criminal and brought him to jail.
3. Lightning is a natural form of _____.
4. Last year, there was a _____ in the number of crimes.
5. We wished her a quick _____ from her operation.
6. The nurse _____ the doctor with the operation

Figure 6.2: Example of two types of in-class tasks used for practicing the component words of the targeted collocations

In the second phase of the intervention, five collocations per day were taught to each of the three classes in the reverse order from the one used in the individual word phase. This was intended to balance out the time of exposure for each target collocation. Each targeted collocation was presented in two context sentences, adapted either from the Ludwig website or in a few cases from the World Wide Web (Google search) in a simplified form. Learners' attention was directed to whether the noun in each targeted collocation was countable or uncountable and which articles it usually occurred with. As all collocations were considered L1-L2-congruent, there were no anticipated problems in using L1 translation whenever it was needed as a way to unambiguously explain the exact meaning of the collocation. In fact, the use of an L1 translated definition was believed to be useful, as demonstrated by previous studies on collocation instruction (e.g., Webb and Kagimoto, 2009), and especially as the targeted students had a relatively low level of language proficiency. Figure 6.3 shows a sample of the instructional materials used during the presentation stage of the whole collocation phase (for the whole sample, see Appendix J).

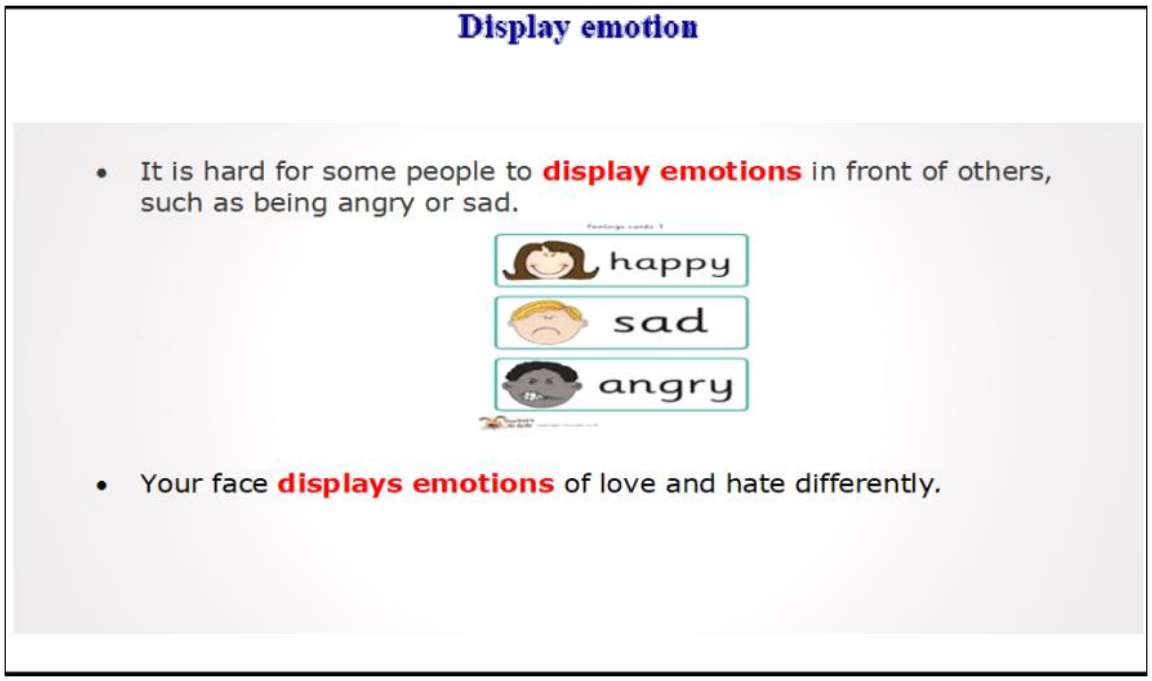


Figure 6.3: Example of teaching material used for the teaching of a collocation (Display emotion) during the collocation teaching phase

(Activity 1) Instructions: Choose the best answer/collocation for each definition.

1. (امتلك موهبة) have a natural ability.

- ○ Overcome a barrier
- ○ Implement a treaty
- ○ Possess a talent
- ○ Exercise the imagination
- ○ Switch channel

(Activity 2) Instructions: Complete these sentences with the correct collocation using its translated meaning.

1. He___ (امتلك موهبة) **possessed a talent** ___for painting and his paintings were sold at very high prices.
2. Many people___ (يستبدل القناة التلفزيونية) **switch channels** ___during morning news.
3. When you move to another country you may need time to___ (تغلب على العائق) **overcome barriers** ___to language and culture.
4. The lake was one of the most beautiful places to__ _ (يمارس التصور) **exercise imagination___**.
5. After Edward III became king of England, he___ (طبق معاهدة) **implemented the treaty** ___of York, by which it was agreed that Robert I remain the king of Scotland.

Figure 6.4: Example of two types of in-class tasks used for practicing targeted collocations

Some of the designed activities mainly focused on the semantics of the collocations. For example, multiple-choice tasks required the students to select the corresponding collocation from a list of choices and match it with its translated meaning. Another activity employed during this phase was a gap-filling task which asked the students to supply the missing word, i.e., either the verb or the noun of the collocation, in different context sentences. In a subsequent activity, the students had to provide the whole collocation that fitted the meaning of the sentence, while in another consolidating activity they were asked to produce the entire collocation, using its translated meaning in a complete sentence of their creation in L2, which

was intended to be more challenging and focus more on use rather than recognition (for a sample of these exercises, see Appendix K). After the completion of each exercise, students received feedback on their answers (see Figure 6.4, above, for two example activities used during the collocations teaching phase).

6.5 Methodology: the testing phase

6.5.1 Evaluating production of the collocations

A modified version of the CONTRIX test developed by Revier (2009) was used in this study as the main instrument to investigate the role of semantic transparency in the productive acquisition of L2 collocations. This particular test was adapted because it was the most extensively piloted and validated instrument available for the assessment of verb + noun collocation productive knowledge (see Chapter 3, Section 3.2.1 for more details on this test). In fact, CONTRIX was the only existing, extensively validated collocation test at the time of data collection, and was specifically intended to measure the effect of semantic transparency on L2 productive collocational knowledge. However, in the adapted test, efforts were made to overcome some of the weaknesses of the original CONTRIX. For instance, the semantic transparency in the original version of this test was established on the basis of (1) a collocational dictionary, which was hypothesized to present the literal meaning of a word as the first meaning listed for each entry word; and (2) the author's judgement as to whether each component word of a collocation is used literally or non-literally. Another problematic aspect in Revier's test pertains to his evaluation of semantic transparency as an absolute rather than a scalar notion. This method, as conceded by Revier, is considered an unreliable way of estimating semantic transparency. In fact, his method is questionable compared to the use of pooled human judgments, which is regarded as the most consistent approach in establishing the semantic transparency of lexical items (Pollatsek and Hyönä, 2005; Frisson et al., 2008). In the present study, the limitations of Revier's method were overcome by the

use of both human ratings and distributional measures to evaluate the relative semantic transparency of collocations, which is here considered a continuous variable rather than operating at discrete levels (for more details on this, including a critique of Revier's method in establishing semantic transparency, see Chapter 2, Section 2.3; Chapter 3, Section 3.4.4; and Chapter 5, Sections 5.3 and 5.5)

Two further limiting aspects of CONTRIX pertain to its implementation with only intermediate and advanced learners, and restriction of the test items, which numbered 45 in total, to noun collocates of 14 predetermined polysemous verbs. This means that 14 verbs were repeatedly used in the list of 45 test items. In the present study, the test was adapted in order to render it suitable for lower proficiency level learners. Furthermore, only unique items for both the verb and noun constituents of the collocations were included to control for the effect of increased encounters of the verbs compared to the nouns in the set of targeted collocations. As mentioned in Chapter 3, Section 3.2.1, CONTRIX is formatted as a cloze task with 45 items in total. Each consists of a sentence gap to be filled by selecting one item out of three choices from each of three columns listed next to each prompt sentence. The objective is to create a word combination of a verb, an article/zero article and a noun that best fits the context of the sentence. This test format, viz, a type of multiple choice, has often been perceived as targeting perceptive knowledge, since it apparently mainly requires meaning recognition. However, Revier (2009) argues that it measures productive knowledge because "test takers must not only create (i.e., produce) meaning by combining lexical constituents, but they must also grammatically encode the noun constituent for determination" (p.129). The productive quality of CONTRIX was further validated in a later empirical study (Revier, 2014).

The collocation production test employed in the present study adopted a similar format to that of CONTRIX, but some alterations were necessary. For instance, the items in the tests

were the 44 collocations which were selected for teaching in the intervention study. Moreover, new sentence prompts and distracters that corresponded to the new items were also created, with most of the sentence prompts taken from the Ludwig website mentioned above. The use of this website was preferable to COCA because its context sentences were found to be simpler than those found in COCA and thus more suited to the linguistic level of the targeted participants. A few prompt sentences were adapted from the World Wide Web (Google) when suitable ones could not be found on the Ludwig guru website (2014–2021). However, all the words used in these context sentences had to conform to the condition of being frequent words. In other words, none of the words in the sentence prompts were beyond the frequency rank of 2,000; most were in fact from the 500 most frequent words in the COCA frequency-ranked list. The purpose of using sentences with frequent words was to ensure that these sentences were easily comprehended by the targeted students and more likely to be familiar to them, especially as their expected vocabulary knowledge was approximately at the level of the 2,000 most frequent words. As with CONTRIX, all prompt sentences were made to require the infinitive form of the verb, except for one sentence that required a verb in the simple present tense (*rules the universe*). Limiting the number of different verb forms to mostly infinitives was intended to reduce the possibility of their influence on the choice of correct answers when students attended to the verb's inflectional morphology (as suggested by Boers, Dang and Strong, 2017b, p.369).

The procedure for selecting distracters or the alternative choices in the production test employed here had to be different from that followed in CONTRIX. There were two alternative choices for each item: one was another collocation from the 44 targeted collocations that did not fit the context of the tested collocation, whereas the other was an unreal or pseudo-combination, which was created by combining a verb and a noun from the 44-collocation list that do not usually go together. For example, in the example provided

below (Figure 6.5), the correct choice was the collocation *negotiate an arrangement*. The collocation *celebrate a wedding* was one of the alternatives offered, but it did not fit the context sentence. The second alterative choice was **deserve imagination*, which was an unreal collocation created by combining the verb from the collocation *deserve an award* and the noun from the collocation *exercise the imagination*. Thus, all the items included in the matrix of choices were words to which the targeted students were exposed during the training period. This was intentional to avoid the risk that the students would be able to easily guess the correct collocation simply because its words were remembered from the teaching intervention. In other words, the exclusion of distractors would not have been because they were perceived as wrong choices but because they had not been taught to the students in the intervention. A sample of the collocation production test is displayed in Appendix L.

1. Before you leave a job, try to [ ] with your boss to make your leaving a lot easier.	celebrate	a/an	imagination
	negotiate	the	arrangement
	deserve	--	wedding

Figure 6.5: Example of an item included in collocation production test

To assess the quality of the modified productive collocation test, it was piloted with a number of English native speakers and EFL learners. Along with this collocation test, a questionnaire similar to the one used to validate the Word Familiarity Test was also administered during the piloting to obtain feedback from the test takers about the perceived difficulty level, instruction clarity and appeal of the test. The native speakers were American teachers who had been teaching EFL at a university in Riyadh, Saudi Arabia, had taken this test and scored the maximum number of points on it. The EFL learners were 20 students from a local high school in Riyadh who had a higher language level than the targeted eighth-graders and were therefore more likely to be familiar with the vocabulary used in the tests. 19 of the 20 students answered all items correctly. One item in this test was incorrectly answered

by a student who, as she commented, was not familiar with the meaning of the component words of that specific collocation. It was decided to retain this item in both tests, however, as it was only problematic for this particular student, which would not be the case for the targeted students, who would be taught all items before the testing. Furthermore, during the piloting with the high school students, the test instructions were orally translated into Arabic to avoid any misunderstanding. As this went well, it was planned to provide a translation of the test instructions during its main administration. A further purpose of the pilot was to check the time required to complete the test. The piloting showed that the test could be completed in less than 30 minutes, which was taken to be the minimum time needed to finish this particular test.

On the day immediately following the end of the teaching intervention, CONTRIX was administered to the targeted students, who were not pre-warned that they would be taking the test. The students (94 students in total) from all three classes were seated in one large room for the test. An L1 translation of the test instructions was offered, and any explanations required were provided by the researcher. Although no maximum time was set for taking the test, no student took more than 30 minutes to complete it.

The scoring for the collocation productive test followed the same system employed by Revier (2014) and was carried out as follows. A point was awarded only upon the correct selection of both constituent words, viz, the verb and the noun comprising the collocation which fitted the context sentence. This was regardless of whether or not a student correctly chose the right article/zero article to fit the constructed collocation. The incorrect selection of either the verb or noun was scored as zero even when one component word was correctly selected but not the other. The main reason for using this marking system was in order to be consistent with prior uses of this test and to obtain results that could be compared with other published results. A further reason why this scoring system was adopted was because the test

aims to assess the learners' ability to arrive at the holistic meaning of the targeted collocation. In other words, it aims to test whether or not the learners have formed a lexical-semantic association between the verb and noun of a collocation that enables them to recall it as a whole from multiple choice answers. However, the test is not intended to measure learners' grammatical knowledge, which is why the correct/incorrect selection of grammatical elements, viz, the article/zero article, was not taken into consideration in the scoring system. As the number of test items was 44, the maximum score was 44 points.

6.5.2 Evaluating recognition of the collocations

A second instrument was employed to test the influence of semantic transparency on the perceptive acquisition of L2 collocations. It was adapted from COLLMATCH (Gyllstad 2009), which is one of the few rigorously validated collocation instruments available that is designed to assess the perceptive knowledge of verb + noun collocations (for more detail on this test, see Chapter 3, Section 3.2.2). Similarly to CONTRIX, this test elicits knowledge of the collocation as a holistic unit and not just part of it, but here at the recognition level. A positive aspect of the test is that it uses distracters to avoid blind guessing and learners' tendency to over-estimate their knowledge.

The format of the perceptive collocation test used in the current study is similar to COLLMATCH to a certain extent. The test was modified to include 63 items in total, following the same procedure as Gyllstad (2009) in ensuring that the ratio of targeted real collocations to false ones was 70:30. Therefore, the test items included the 44 targeted real collocations and 19 false combinations. These false combinations were created by randomly combining a verb and a noun which do not frequently occur together from the set of 44 targeted collocations. The combinations included articles/zero articles when applicable to make them resemble real collocational constructions as far as possible. Figure 6.6 presents an

example of four items included in the collocation recognition test (see Appendix L for a sample of the whole test).

57 negotiate an arrangement	58 practice a craft	59 contact a clock	60 display emotion
[X] Yes	[X] yes	[ ] yes	[X] yes
[ ] No	[ ] no	[X] no	[ ] no

Figure 6.6: Example of 4 items included in the collocation recognition test

The piloting of the collocation recognition test was performed with the same subjects (American native-speaker teachers and 20 EFL learners) and followed the same procedures as those used with the production test. The results of this piloting also resemble those of the collocation productive test. The same student who incorrectly answered an item in the collocation productive test also failed to recognize it in the collocation recognition test. According to her feedback, this was because the words in this item were unknown to her. Consequently, no problem was foreseen for the main participants, who would be taught these words. The piloting also showed that, similarly to the production test, the maximum time needed to completed the recognition test was 30 minutes. Hence, the test was considered ready for the main study. The administration of the recognition test took place in the week after the end of the teaching phase and the administration of the production test. Administering the two tests a week apart was an attempt to avoid any practice effects. As with the production test, students were not prewarned that they would be taking the recognition test.

The scoring method used with this recognition test resembles Gyllstad's (2007) scoring of COLLMATCH and was calculated in the following way. A point was given for both correct recognition of real collocations and correct rejection of the pseudo-collocations in the test. Missed and false responses, i.e., incorrect identification of real collocation and pseudo-collocations, were given zero points. The incorrect identification of false collocations means

that the learners make an erroneous claim of combinatorial potential for strings of words occurring in the language of native speaker of English. The maximum score was 63, which corresponded to the total number of test items. The scores for this test, viz the recognition test, as well as the production test, were recorded for all 94 students in Excel and quantitively analyzed using SPSS, as described in more detail in the next section.

6.6 Results

This section focuses on reporting the test scores of the 94 students. As mentioned above, these students took two collocation tests (one productive and one perceptive) after undertaking a five-week teaching intervention on 44 collocations. The main objective of the analysis was to find out whether differences in the degree of semantic transparency of the tested collocations had any impact on the students' learning gains. An additional aim of the analysis was to examine how well the students learnt the 44 collocations as a result of the teaching intervention. The analysis was performed with descriptive and inferential statistics, using tables and graphs to illustrate patterns of data and correlational tests to investigate the potential correlational relationships between the variables and whether or not any found correlation is derived by chance or evidencing some real effect. The non-parametric Spearman's test was the main test used for this purpose because all data was not normally distributed, as evidenced by the graphical representation of their distribution with histograms below. A chi-square test was sometimes used to determine whether an association between categorically recorded variables was statistically significant. However, it should be noted that any statistical correlation does not imply a causal relationship.

The results of the analysis are reported in five sections. The first two sections describe the overall learnability data of the collocations by considering the results of the tests as distributed by students (Section 6.6.1) and tested items (Section 6.6.2). The third section, Section 6.6.3, is concerned with answering the main research question that guided this study,

namely to what extent the degree of semantic transparency, here established by human transparency ratings, affects collocation learnability. Section 6.6.4 examines the potential influence of the time of testing and the presentation order of collocations in the teaching intervention on the one hand and their relation with the degree of semantic transparency on the other hand. Section 6.6.5 looks for evidence of the possible impact of semantic transparency on the learnability of collocations, but here when the semantic transparency of collocations was estimated by distributional measures.

6.6.1 Test results analyzed by student

The following descriptive analysis, including some correlational analysis, aims to explore how well the students performed on the two collocational tests and any observed pattern in their performance. The two bar charts below, Figures 6.7 and 6.8, represent the ninety-four students' overall scores on the production and recognition tests respectively. Both charts illustrate that the majority of students performed very well on both tests. The highest bar in the first chart (Figure 6.7) shows that 33 students were able to achieve the maximum score of 44 on the production test, while 14 students receive the maximum score of 63 on the recognition test (Figure 6.8).

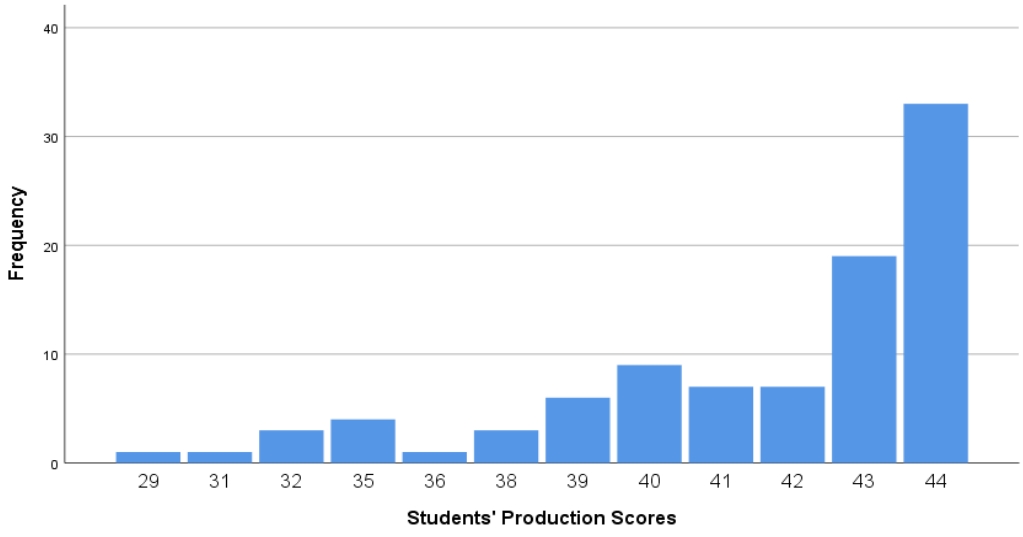


Figure 6.7: Frequency count of students' production scores

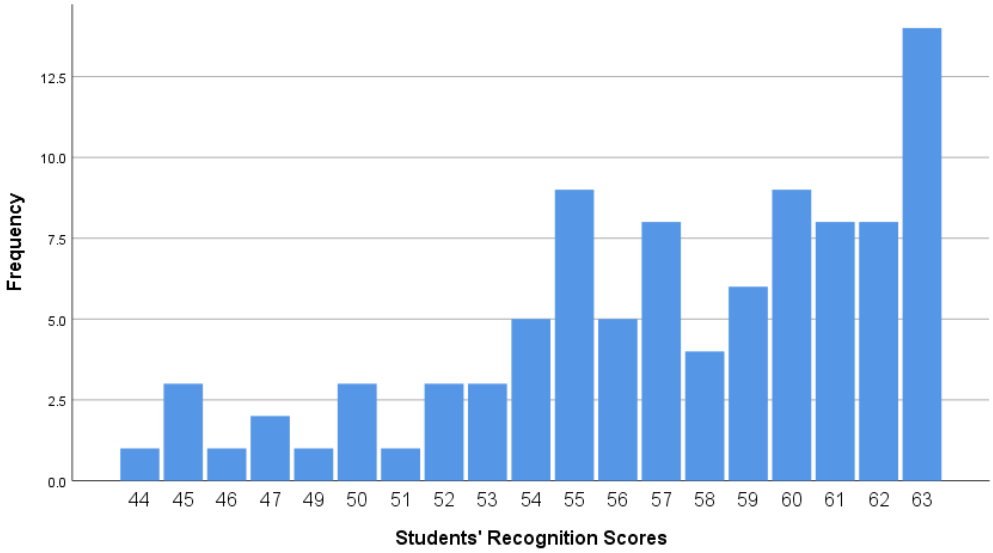


Figure 6.8: Frequency count of students' recognition scores

To gain more insight into the variation and distribution of the students' scores on both combined tests, and in their performance on each test respectively, three side by side boxplots were drawn (Figure 6.9). It can be seen in Figure 6.9 that the overall performance is slightly better on the production test (the left boxplot) than the recognition test (the medile boxplot), as the median of the former was about (98%) while the latter was about (93%), which might be due to the delay of the adminstration of the recognition test (see Section 6.7 for a full account of the possible reasons behind this surprising result). The distribution of the recognition scores seems to be roughly symmetrical, whereas the distribution of the production scores is more left skewed as its median is a little closer to its third than its first quartile. Four outliers can be identified down the lower whiskers of both the production and the recognition scores boxplots. However, it seems that the outliers in the production boxplot are located further away from the rest of the data, indicating a wider distribution of the scores compared to the recognition boxplot. In general, the scores for the production skills appear to be better than for the recognition skills as the median of the percentage scores is a little higher. However, the lowest score achieved on the recognition test was (70%) , which was higher than that of the production, which was (66%) .

The right-hand box plot in Figure 6.9 displays the students' overall learnability scores, which were calculated as the average percentage scores across both the recognition and production tests. It clearly illustrates a very high overall achievement of the students on both tests, with a median score of about (95%). In fact, 14 of the 94 students were able to achieve the maximum percentage score (100%) on both tests. Overall, the scores ranged from (63%) to (100%), while the majority of the overall scores lay between (89%) and (98%). The box plot also shows that the distribution of the scores is roughly symmetrical. The lower whisker is longer than the upper one and therefore the scores are wider in range in that section. Below the lower whisker, five outliers can be identified, the farthest one with the minimum percentage score of (69%). Thus, it can been seen that most of the students performed similarly in their overall performance, which was quite high, with only four students performing at a relatively lower level.

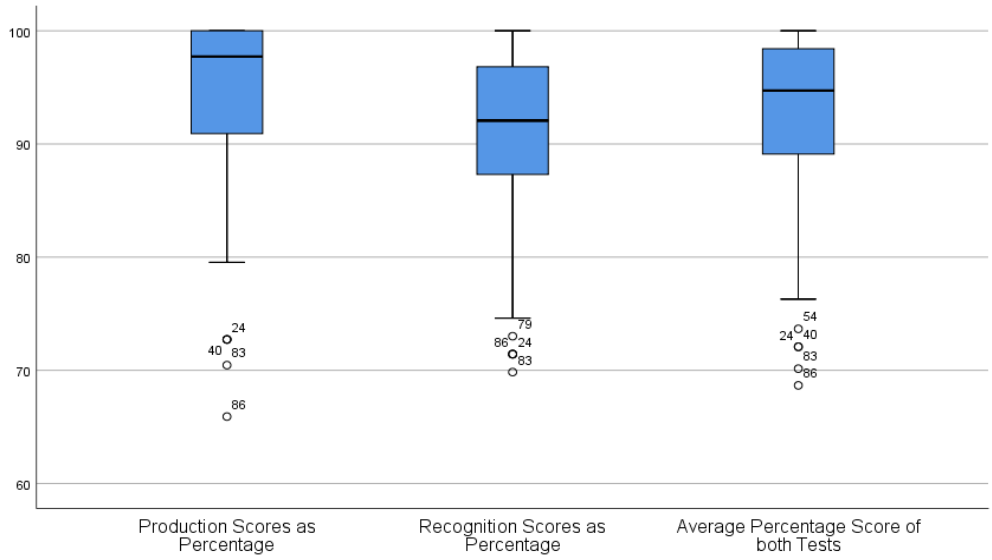


Figure 6.9: Three box plots showing the students' average percentage score on both tests, as well as production and recognition scores as percentages

The paired boxplots in Figure 6.10 graphically depict whether the students differed in their recognition of correct and incorrect collocations, which together made up the test items in the recognition test. The left boxplot represents the students' recognition scores for correct items (44 in total) and the right boxplot displays their recognition scores for incorrect items

(19 in total), both as a percentage. According to both boxplots, it seems that students did slightly better at identifying/rejecting the wrong collocations than recognizing the correct ones, though the difference is rather small and not significant. The median score for incorrect item identifications, about (94%), is marginally higher than the median score for correct item recognition, which is about (93%). The scores for identification of incorrect items lie between (68%) and (100%), while the scores for recognition of correct items range between (61%) and (100%). The left boxplot representing the recognition scores for correct items seems to be skewed left with a longer whisker and more outliers than the right boxplot displaying the recognition scores for incorrect items. This may suggest that the scores for the perception of correct items, compared to the scores for identifying wrong items, may not be as normally distributed and with a larger variance among ther lower values, as shown by the longer lower whisker of boxplot representing the correct item recognition.

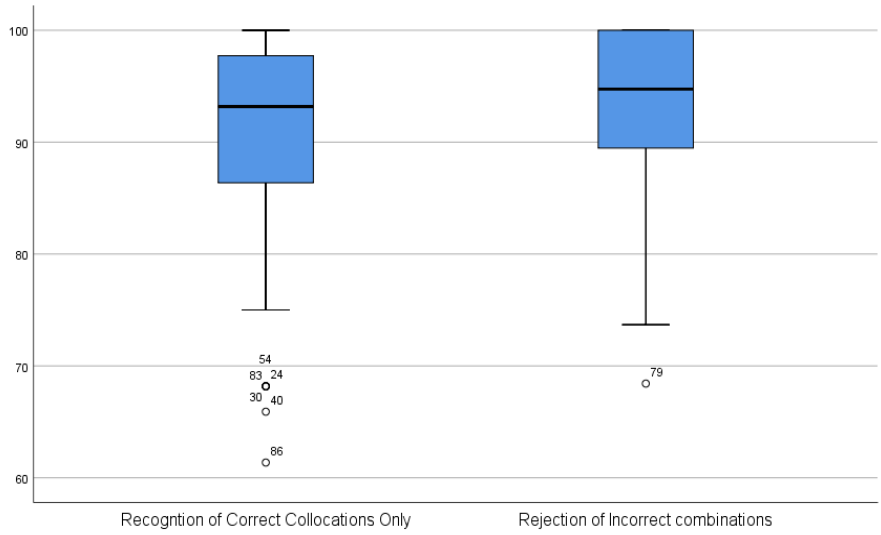


Figure 6.10: Paired boxplots showing the students' recognition scores as percentage for correct items against their recognition scores as percentage for incorrect items

To check whether the observed difference between the recognition of correct and incorrect items is significant, a chi-square test was carried out. (This test is fitting as the compared items were categorically recorded variables.) However, no statistically significant difference was found between the recognition of correct and incorrect collocations, $\chi 2$ (1, N =

94) = .67, p = .41, since the p-value here is greater than the chosen significance level (p= 0.05).

The scatterplot in Figure 6.11 illustrates graphically the relationship between the students' performance on production and recognition tests and shows a positive linear relationship between the students' collocation recognition and production skills. This strong correlation was found to be statistically significant, based on the value of the computed Spearman's correlation coefficient (rs(92) = .94, p < .01). This shows that, as the students' recognition scores increase, so do their scores on their production test, which further suggests that both their perceptive and productive collocational acquisition have developed in parallel.

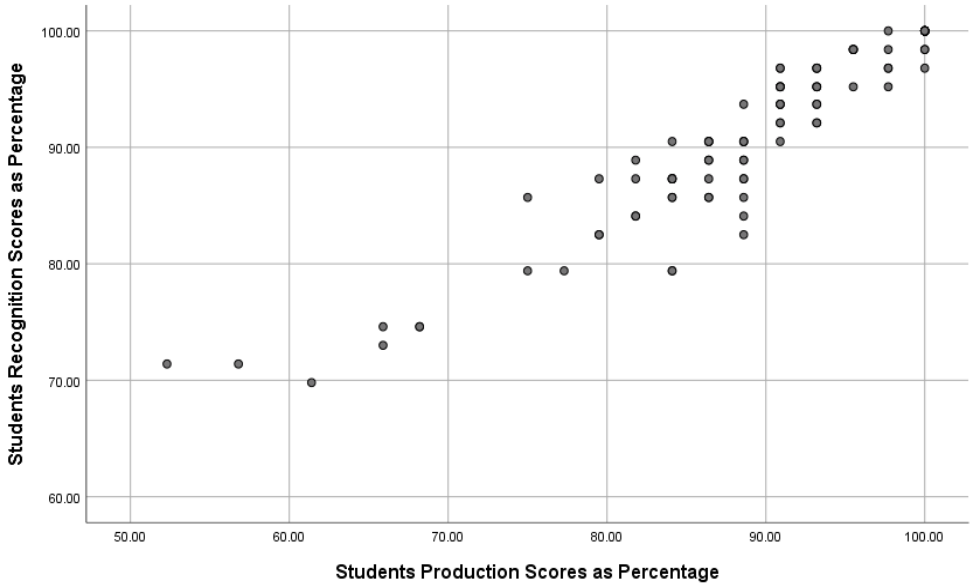


Figure 6.11: Scatter plot showing the students' production scores against their recognition scores as a percentage

6.6.2 Test results analyzed by collocation

From this point onwards the scores are presented by collocation. Thereby, it should be noted that the results for the target collocations do not include the results for the distractors (i.e., the unreal 19 combination items) from the recognition test, which are analyzed separately below. All learnability scores per collocation, i.e., the production score, recognition score and overall learnability score, are shown in Table 6.6 and represented graphically in Figures 6.12 to 6.14 respectively. The scores are recorded in the table both as

absolute values and percentages. In all the Figures, successful production, recognition and overall learnability are indicated by 'Yes' (red bars), whereas failed production, recognition and overall learning are indicated by 'No' (blue bars). As 94 students took the tests, 94 is considered the maximum score for each collocation in both the production and recognition tests. The overall learnability score for each collocation was calculated as the average percentage score of both its production and recognition scores.

It can be seen from Table 6.3 and Figure 6.12 that the production scores range between 75 and 94 (*M*= 88.41 *SD*= 3.99), while the modal value is a score of 92 (98%) for 6 out of 44 collocations. The prevailing red color seen on the bars in Figure 6.13 show that most collocations were successfully produced. The highest production score was 94 or (100%) for the collocations *accomplish an objective* and *occupy a territory*, while the lowest production score was 75 or (80%) for only one collocation, *dismiss the suggestion*.

The recognition scores per collocation, as seen in Table 6.3 and Figure 6.13, range between 73 and 93 (*M*=85.16, *SD*= 6.02). While the mode value was 91 (97 %) for seven of the 44 collocations, the blue color seen on all bars in Figure 5.13 clearly shows that none of the collocations was recognized by all the students and the highest recognition percentage score was (99 %) for the two collocations, *assist the recovery* and *switch channels*, whereas the lowest recognition percentage score was (78%) for the collocation *cast a reflection*. In comparison with the average percentage of the production scores (94%), the average percentage of the recognition, (91 %), exhibits a (3%) reduction, which unexpectedly shows that collocation production was generally slightly better than collocation recognition. This might be explained by the fact that the recognition test was administered later than the production test and its items were uncontextualized, in contrast to those in the production test

Table 6.3 Production scores, recognition scores and overall learnability by collocation

Collocation	Production/93	Production %	Recognition/93	Recognition %	Average %
switch channel	93	98.9	93	98.9	98.9
assist recovery	92	97.9	93	98.9	98.4
accomplish an objective	94	100	91	96.8	98.4
occupy territory	94	100	90	95.7	97.9
balance a load	92	97.9	91	96.8	97.3
enhance someone's reputation	93	98.9	90	95.7	97.3
permit entry	92	97.9	91	96.8	97.3
impose a penalty	92	97.9	91	96.8	97.3
approve a recommendation	91	96.8	92	97.9	97.3
doubt the existence	91	96.8	92	97.9	97.3
process a request	92	97.9	91	96.8	97.3
negotiate an arrangement	92	97.9	91	96.8	97.3
translate a phrase	91	96.8	91	96.8	96.8
overcome a barrier	93	98.9	89	94.7	96.8
inform selection	90	95.7	90	95.7	95.7
assign priority	91	96.8	88	93.6	95.2
enable the viewer	90	95.7	89	94.7	95.2
yield an insight	90	95.7	89	94.7	95.2
deserve an award	89	94.7	89	94.7	94.7
monitor pollution	89	94.7	89	94.7	94.7
embrace diversity	88	93.6	90	95.7	94.7
detect an error	91	96.8	86	91.5	94.1
possess a talent	90	95.7	86	91.5	93.6
vary the height	88	93.6	86	91.5	92.6
restore trust	89	94.7	84	89.4	92
rule the universe	90	95.7	83	88.3	92
implement a treaty	87	92.6	85	90.4	91.5
shape the curriculum	86	91.5	85	90.4	91
celebrate a wedding	87	92.6	84	89.4	91
assess a personality	87	92.6	82	87.2	89.9
practice a craft	88	93.6	81	86.2	89.9
accompany an exhibition	86	91.5	81	86.2	88.8
adapt a recipe	87	92.6	79	84	88.3
contact the manufacturer	82	87.2	83	88.3	87.8
race the clock	86	91.5	79	84	87.8
plant a flag	85	90.4	78	83	86.7
bury waste	85	90.4	78	83	86.7
arrest the decline	87	92.6	75	79.8	86.2
exercise the imagination	85	90.4	77	81.9	86.2
resist infection	84	89.4	76	80.9	85.1
display emotion	82	87.2	76	80.9	84
cast a reflection	84	89.4	73	77.7	83.5
distribute electricity	80	85.1	75	79.8	82.4
dismiss a suggestion	75	79.8	75	79.8	79.8

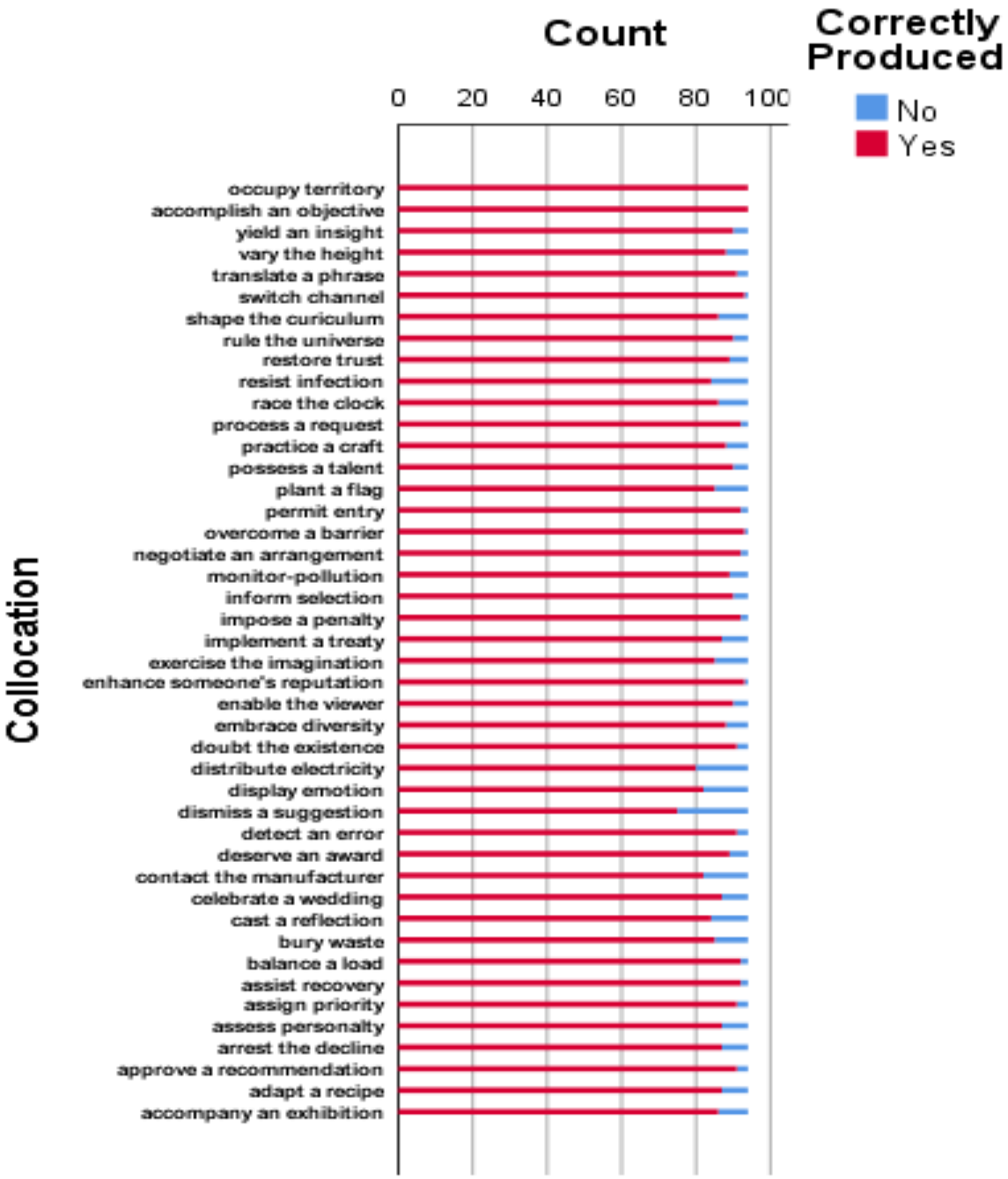


Figure 6.12: Bar chart of production scores per collocation

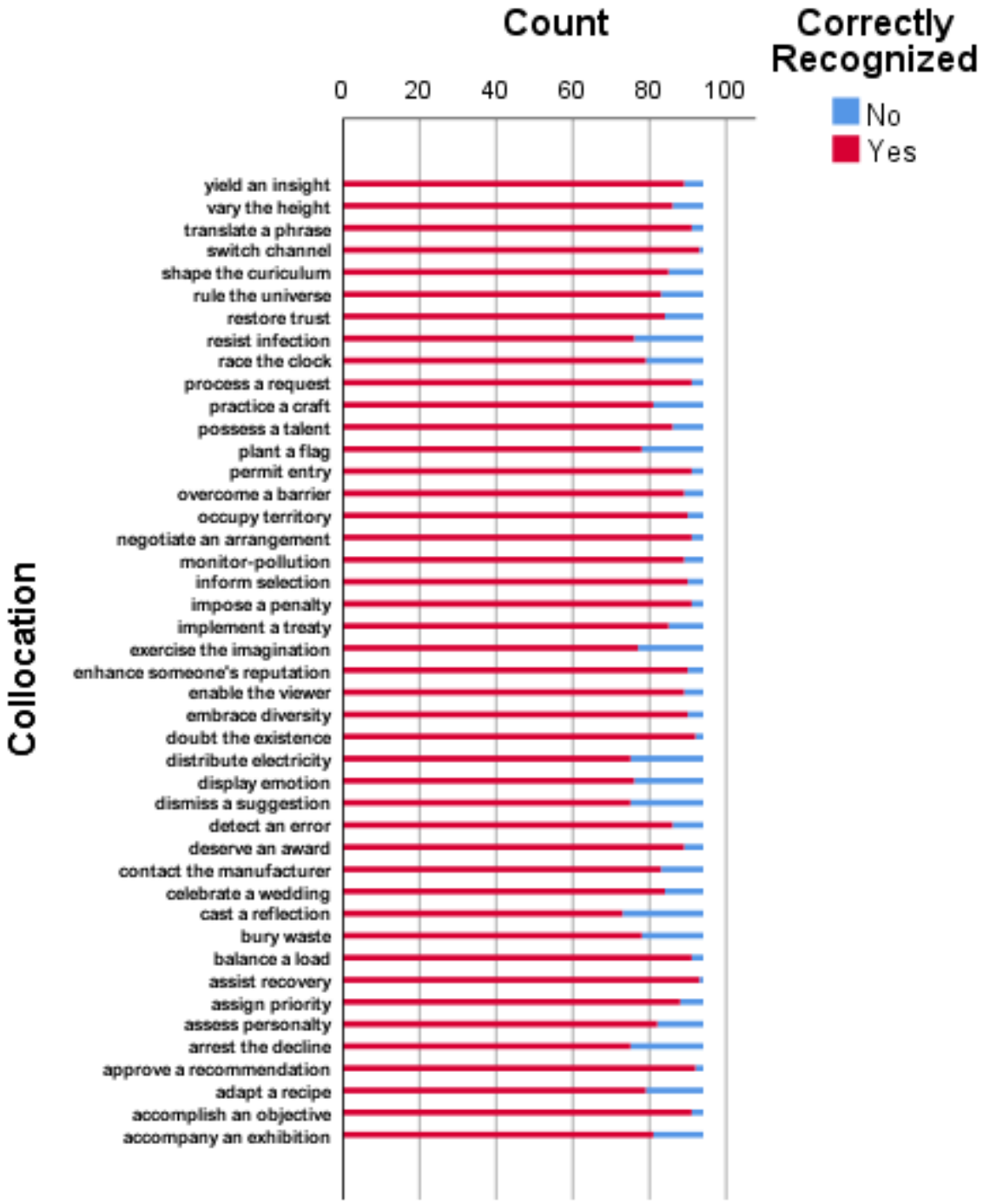


Figure 6.13: Bar chart of recognition scores per collocation

Figure 6.14 and Table 6.3 illustrate the overall learnability of each collocation in terms of the average percentage score across both tests. The scores range between 79.80 and 98.90 (*M*=92.31, *SD*= 5.11). The modal value was 92 (98%) for eight collocations of the 44 items. The bar graph in Figure 6.14 shows some variation in the learnability of each collocation. In general, the overall scores indicate high learning gains with respect to all collocations. The highest overall learnability score was (99%) for the collocation *switch-channels*, and the lowest was (80%) for the collocation *dismiss the suggestion*.

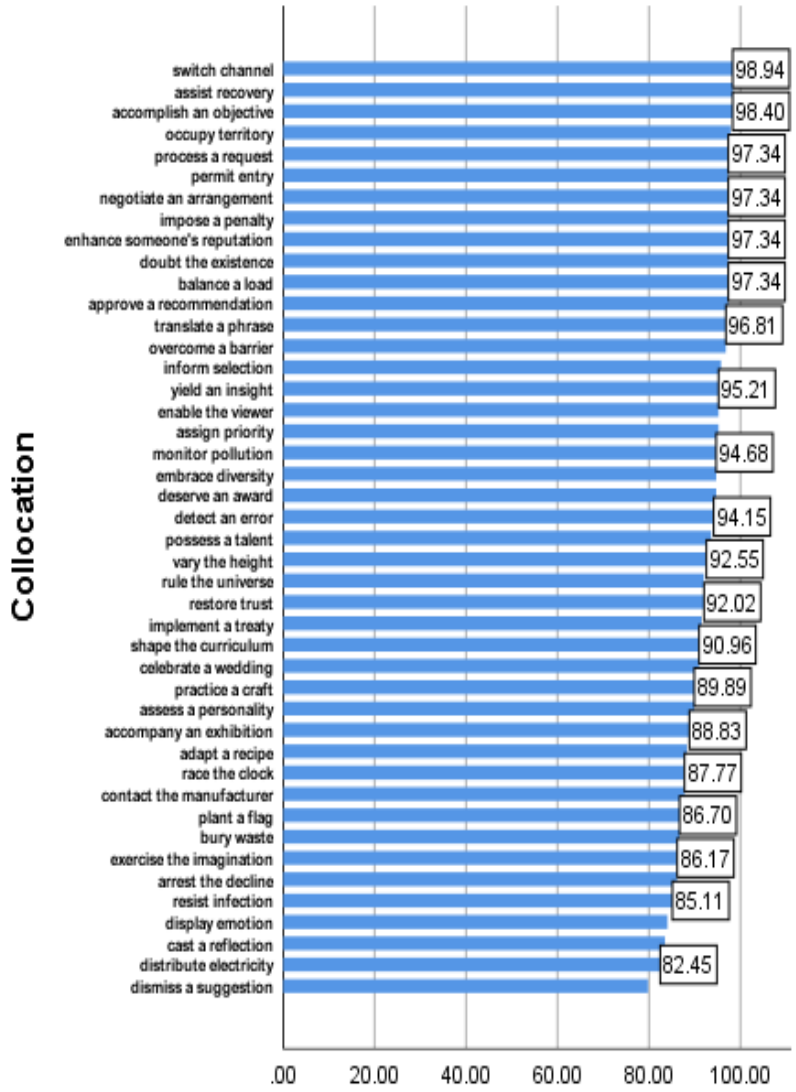


Figure 6.14: Average percentage score of both tests representing the overall learnability per collocation

Table 6.4 and Figure 6.15 show the correct identification scores for each of the 19 incorrect items that were included in the recognition test. The scores are shown in the table as absolute values and percentages and were out of 94, ranging between 81 and 90 (*M*=85.79, *SD*=2.39). As can be clearly seen in the bar chart, none of the incorrect collocations were identified successfully by all students. The highest percentage score for a successfully identified incorrect collocation was (96%) for *occupy a selection*, and the lowest percentage score was (86%) for the incorrect collocations *cast a personality* and *adapt recovery*. The average percentage score for all incorrect combinations was (91%), which is only (1%) higher than, and approximately equivalent to, the average percentage of the recognition of real collocations (90%), as mentioned in the above section.

Table 6.4: Recognition scores for incorrect items in recognition test

Item No.	Incorrect Collocation	Incorrect Collocation Recognition Score	Incorrect Collocation Recognition Percentage Score
1	embrace the imagination	87	92.6
2	exercise a reputation	87	92.6
3	monitor a request	89	94.7
4	deserve pollution	86	91.5
5	occupy a selection	90	95.7
6	doubt an award	89	94.7
7	enable a priority	88	93.6
8	inform a reflection	86	91.5
9	assist a barrier	85	90.4
10	assign an entry	85	90.4
11	impose talent	86	91.5
12	cast a personality	81	86.2
13	accomplish an exhibition	87	92.6
14	balance existence	85	90.4
15	bury the universe	84	89.4
16	adapt recovery	81	86.2
17	celebrate a phrase	85	90.4
18	contact a clock	85	90.4
19	distribute an objective	84	89.4

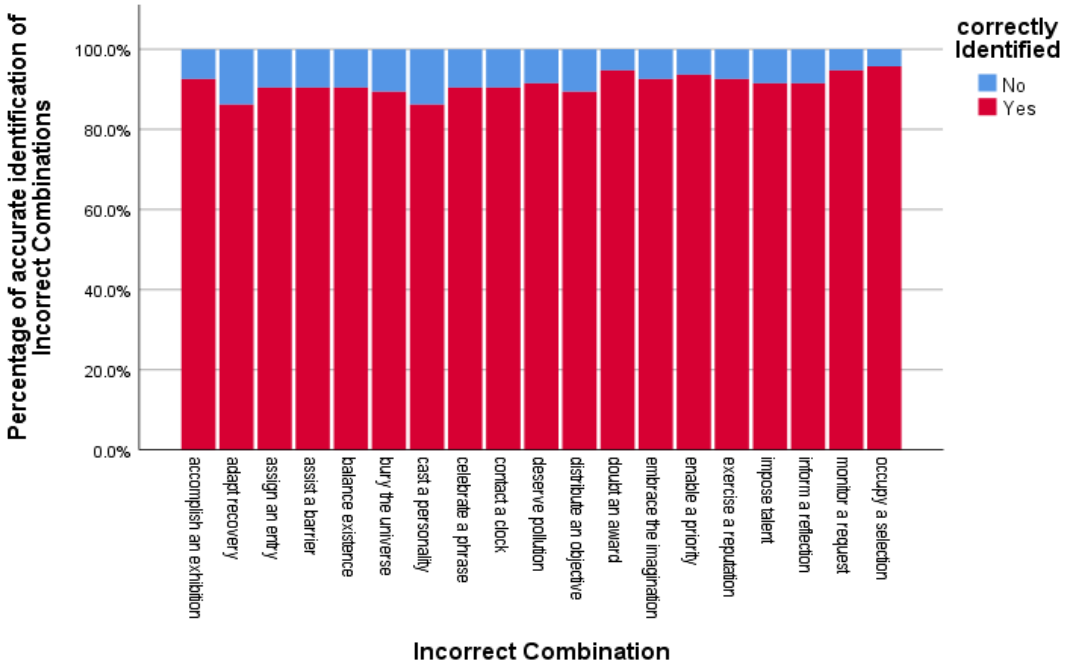


Figure 6.15: Recognition scores per incorrect item

As a further way to graphically display the distribution of the data and to look for evidence of any data outliers, box and whisker plots (Figures 6.16 to 6.18) were produced for the production scores as a percentage per collocation, the recognition scores as a percentage per collocation, the average percentage scores of the overall learnability per collocation and the recognition scores as a percentage per incorrect item.

Figure 6.16 below shows side by side box and whisker plots for the production scores and recognition scores as percentages per collocation. They clearly display that the production scores are higher than the recognition scores, but the latter shows more variation in scores and a wider range. The production percentage scores have a median of (95%) between the minimum score of (80%) and maximum score of (100%). The first quartile of the production scores boxplot was (91%) and the third quartile was (98%). One outlier was found for the collocation *dismiss the suggestion* with the lowest mean score of (80%). On the other hand, the boxplot for recognition scores as percentage per collocation has a median of (91%) between the minimum score (78%) and maximum score (99%) and no evidence of outliers. The first quartile of this box plot was (84%) and its third quartile was (96%).

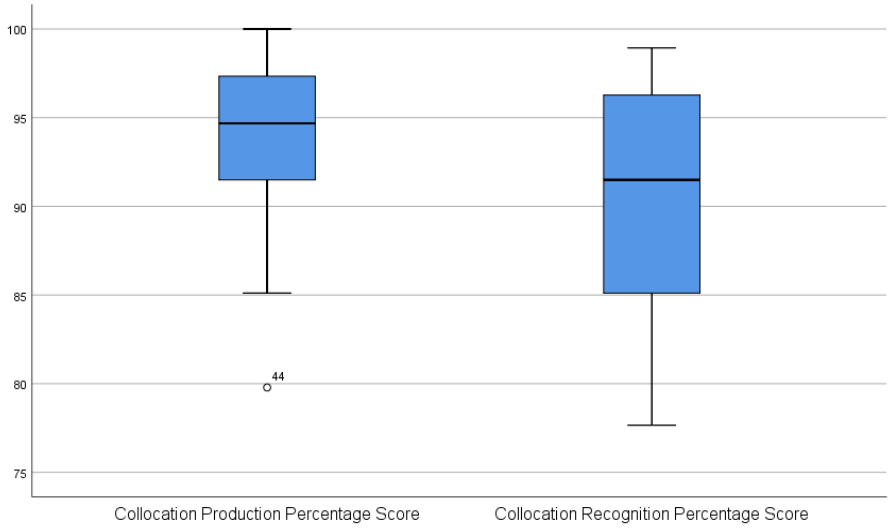


Figure 6.16: Paired boxplot for the production score and recognition percentage score as percentages per collocation

Figure 6.17 below shows a box and whisker plot for the average percentage scores of the overall learnability for each collocation. The median score was (94%), while the minimum score was (80%) and maximum score was (99%). The first quartile was (93%) and the third quartile was (97%), which is not a very wide range. There were no outliers.

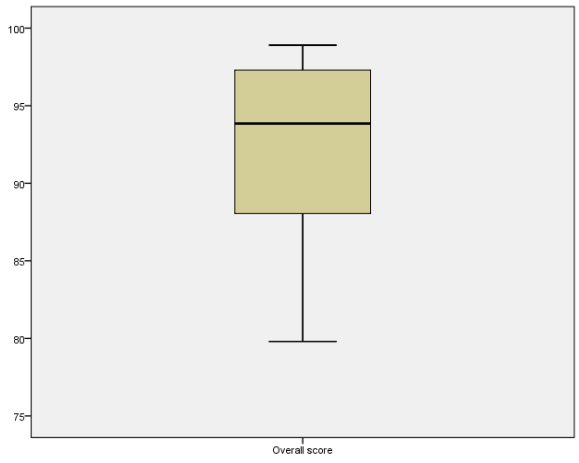


Figure 6.17: Box and whisker plot for the overall learnability score per collocation

Figure 5.18 below shows side by side box plots of recognition percentage scores for correct collocations against recognition percentage scores for incorrect collocations. It is clear

that recognition scores of real collocations show a higher percentage score than the scores of incorrect collocations. The minimum recognition score for correct items (left boxplot) was (78%) against (86%) for incorrect items (right boxplot), while the maximum recognition score for correct items was (99%) against (96%) for incorrect items. Both the recognition scores for correct items and incorrect items had a similar median of (91%). However, it is clear that scores for real collocations had a wider interquartile range, perhaps because there were many real collocations (44) than incorrect ones (19). The recognition score for correct items had a first quartile of (84%) against (90%) for incorrect items. The third quartile for the score of correct items was (96%) with no outliers found, whereas the third quartile for incorrect items was (93%) with two outliers at (86%), which were **cast a personality* and **adapt recovery*.

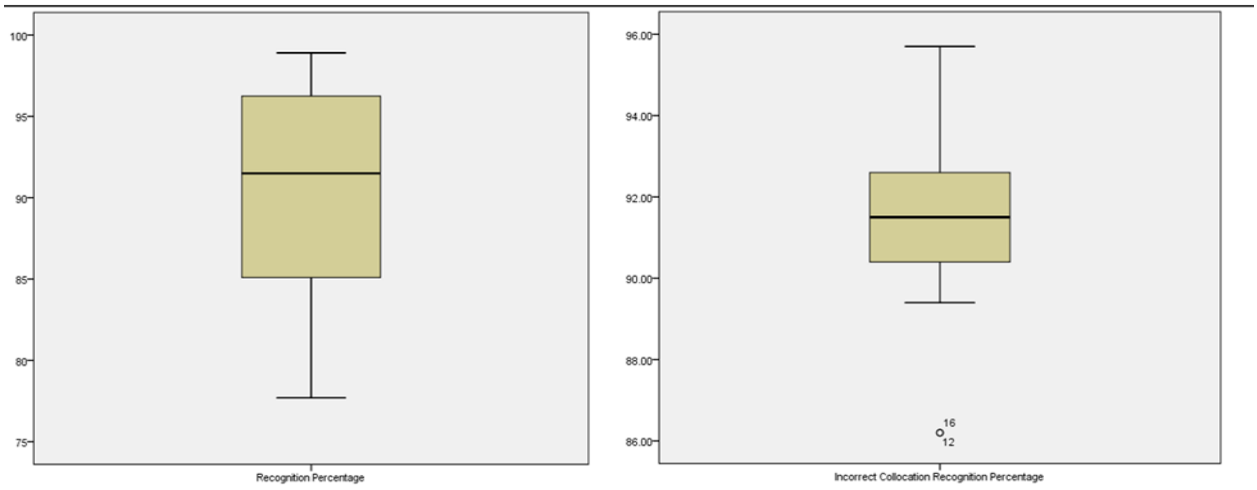


Figure 6.18: Side box plots of recognition percentage score for correct collocations against recognition percentage score for incorrect collocations

The relationship between collocation production and recognition is represented graphically in the scatter plot below (Figure 6.19). A positive linear relationship is clearly shown between the production score and recognition score, suggesting that learning of each collocation whether at production or recognition level was developed in a paralleled pattern.

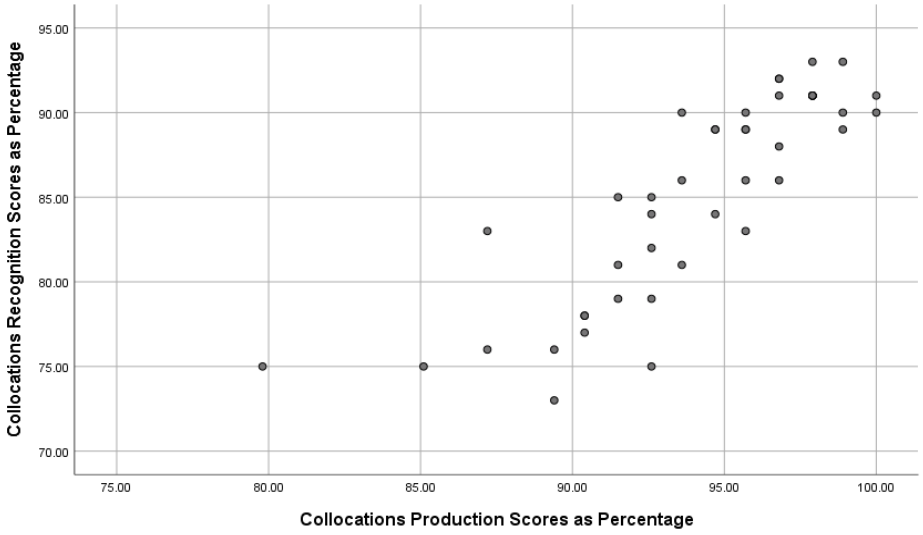


Figure 6.19: Scatter plot of production scores against recognition scores as percentages per collocation

To obtain a clearer picture of this correlational relationship, and to find out whether there is any statistical correlation between ease of recognizing a collocation and ease of producing it, a contingency table (Table 6.5) and a mosaic plot were produced (Figure 6.20), in which successful recognition and production are represented by 'Yes', while 'No' denotes unsuccessful recognition and production for each collocation. The highest percentage of successfully produced collocations (95%) was also successfully recognized in the recognition test, while the remainder (5%) were unsuccessfully learned in the recognition test. On the other hand, the highest percentage of unsuccessfully produced collocations (83%) were also unsuccessfully recognized, whereas the remainder of unsuccessfully produced collocations (17%) were successfully recognized.

A Chi-Square test was performed to statistically test the association between successful production and successful recognition. The Chi-Square value found was $\chi 2$ (1, N = 44) = .16, p = .01, which indicates a statistically significant association between successful production and successful recognition.

Table 6.5: Contingency table for the mosaic plot of successful recognition by successful production

			Successful Recognition		
			No	Yes	Total
Successful Production	No	Count	204	42	246
		% within Successful Production	82.9%	17.1%	100.0%
		% of Total	4.9%	1.0%	5.9%
	Yes	Count	185	3705	3890
		% within Successful Production	4.8%	95.2%	100.0%
		% of Total	4.5%	89.6%	94.1%
Total		Count	389	3747	4136
		% within Successful Production	9.4%	90.6%	100.0%
		% of Total	9.4%	90.6%	100.0%
Pearson Chi-Square= 1659.295677, p-value= 0.000 < 0.01					

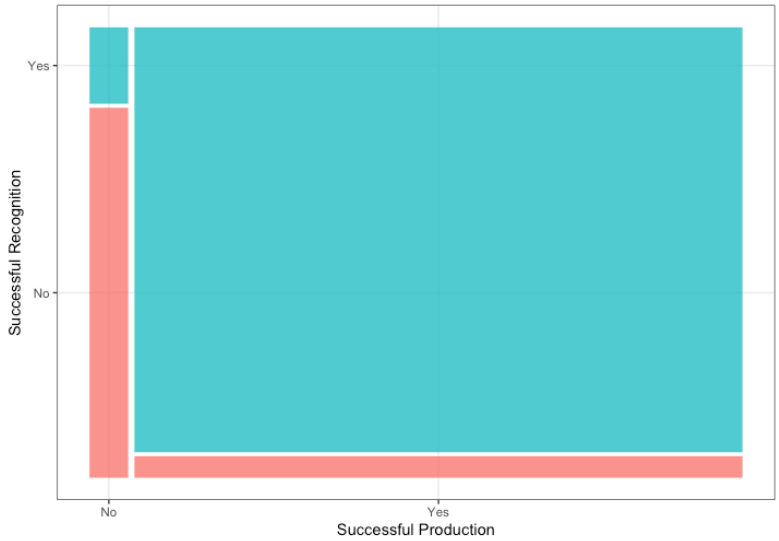


Figure 6.20: Mosaic plot of successful recognition by successful production

6.6.3 Learnability and perceived semantic transparency

In order to answer this study's main research question, which explores the potential correlational relationship between semantic transparency, measured here by human transparency ratings (described in Chapter 5, Sections 5.3 and 5.4), and the learnability of collocations, three scatter plots were produced (Figures 6.21, 6.22 and 6.23) and correlational tests computed (Table 6.6). Each of the three graphs below plots the relationship of median transparency ratings of collocations on one hand against (i) the production scores as

percentages per collocation, (ii) recognition scores as percentages per collocation and (iii) overall learnability scores per collocation. Figure 6.21 shows a positive and fairly strong relationship between the median transparency ratings of collocations and production scores, while Figure 6.22 also displays a similarly strong and positive relation between the median transparency rating of collocations and recognition scores. The third scatter plot (Figure 6.23) similarly illustrates how the median transparency ratings of collocations very strongly and positively correlate with collocations' overall learnability.

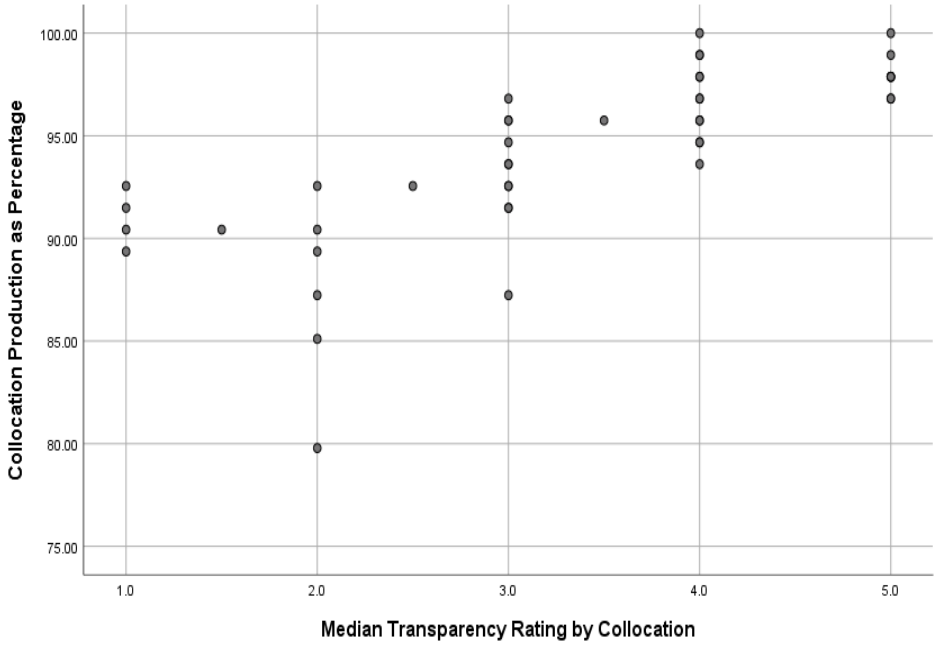


Figure 6.21: Scatter plot for median transparency rating of collocations against production scores as percentage per collocation

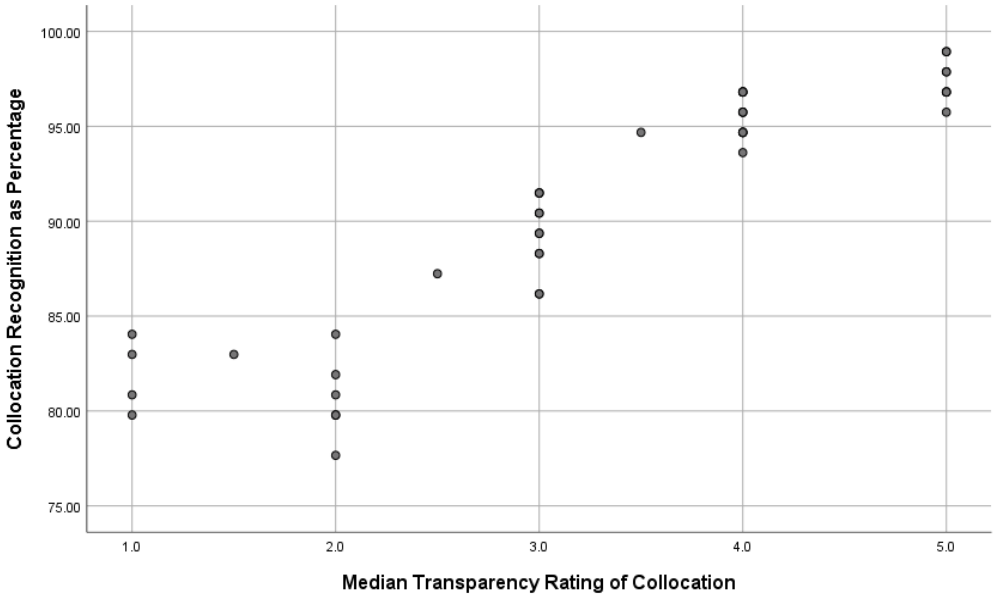


Figure 6.22: Scatter plot for median transparency rating of collocations against recognition scores as percentage per collocation

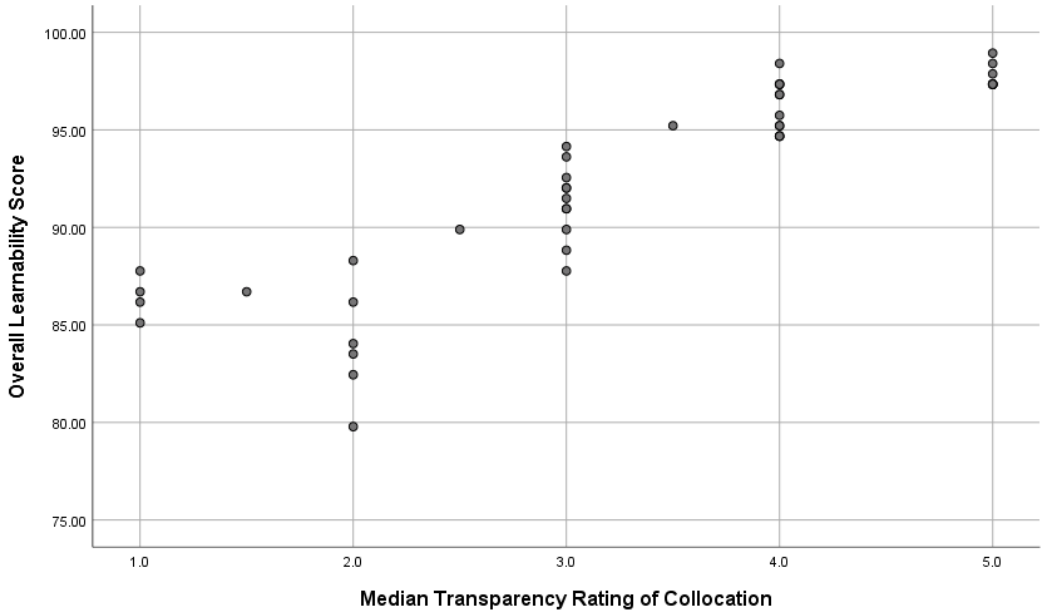


Figure 6.23: Scatter plot for median transparency rating of collocations against overall learnability score per collocation

To further confirm this visually evidenced correlational relationship between semantic transparency and scores related to collocation learnability, the Spearman's correlational test was computed (Table 6.6) (this particular test was chosen as the data was not normally distributed). Indeed, its results reveal that the relative semantic transparency of collocations very strongly correlated with how well the students learnt them. More specifically, the level

of semantic transparency of a collocation clearly appears to have a statistically significant correlation with collocation production, recognition and its overall learnability, as shown by the Spearman's values (rs (42) = .84, .94, .93, p-value < 0.01) in Table 6.6 below. However, it seems that the semantic transparency, as measured by human ratings, correlates with collocation recognition more strongly than with collocation production.

Table 6.6: Correlation between semantic transparency and the production score, recognition score and overall learnability score for each collocation

		Production scores as percentage	Recognition scores as percentage	Overall collocation learnability score	Median transparency ratings of collocation
Production scores as percentage	Pearson Correlation	1	.873**	.954**	.845**
	Sig. (2-tailed)		.000	.000	.000
	N	44	44	44	44
Recognition scores as percentage	Pearson Correlation		1	.971**	.943**
	Sig. (2-tailed)			.000	.000
	N		44	44	44
Overall collocation learnability score	Pearson Correlation			1	.933**
	Sig. (2-tailed)				.000
	N			44	44
Median transparency ratings of collocation	Pearson Correlation				1
	Sig. (2-tailed)				
	N				44

**Correlation is significant at the 0.01 level (2-tailed).

6.6.4 Potential effect of presentation order and difference in time of testing on collocations learnability

In both the individual words and the collocation teaching phases, all the students were taught the targeted collocations in the same order as one another (see Table 6.2 for the teaching schedule). To rule out the presentation order during each phase of teaching as a

potential confound in the results, it was necessary to check whether this variable correlated with semantic transparency (as measured by the human semantic transparency rating), as well as all three collocations learnability scores, i.e., production scores, recognition scores and overall learnability. When Spearman's correlation tests were computed, the relationship between the two presentation orders with transparency ratings, and also their relation with any of the learnability scores, was found to be extremely weak. The exact correlation values between the presentation order during the individual words' teaching phase and each of the human semantic transparency ratings, production scores, recognition scores and overall learnability scores were (r_s (42) = -.08, -.03, -.01, and -.03, $p < .05$) respectively, whereas the exact correlation values between the presentation order during the collocations' teaching phase and each of the human semantic transparency ratings, production scores, recognition scores and overall learnability scores were (r_s (42) = -.04, -.02, -.01, and -.06, $p < .05$) respectively. Hence, this rules out the possibility that the order in which the collocations were presented to the students had any influential impact on their learnability.

A further factor worth investigating is the effect of the time of testing of each type of test, viz, production and recognition, and its relation to semantic transparency. Comparisons of students' scores on both tests revealed that collocation production scores (an average of 94%) were slightly better than the recognition scores (an average of 91 %.). As the recognition test was administered a week after the production test, it was worth looking at which items were most frequently 'unlearned', i.e., that a student got correct in the production test but wrong in the recognition test, and whether such 'unlearning' was related to the degree of semantic transparency of the collocations. Figure 6.24 shows how often each collocation was 'unlearned', and Figure 6.25 shows how often each collocation was 'learned better' or remembered better, i.e., that the student got wrong in the production test but correct in the recognition test. It can be clearly seen in Figure 6.25 that the frequencies with which

the collocations were correctly recognized but not produced were low and appear to be fairly evenly distributed. However, the frequencies with which the collocations were correctly produced but not recognized (unlearned) seem to be skewed to those which were less transparent (based on the human ratings).

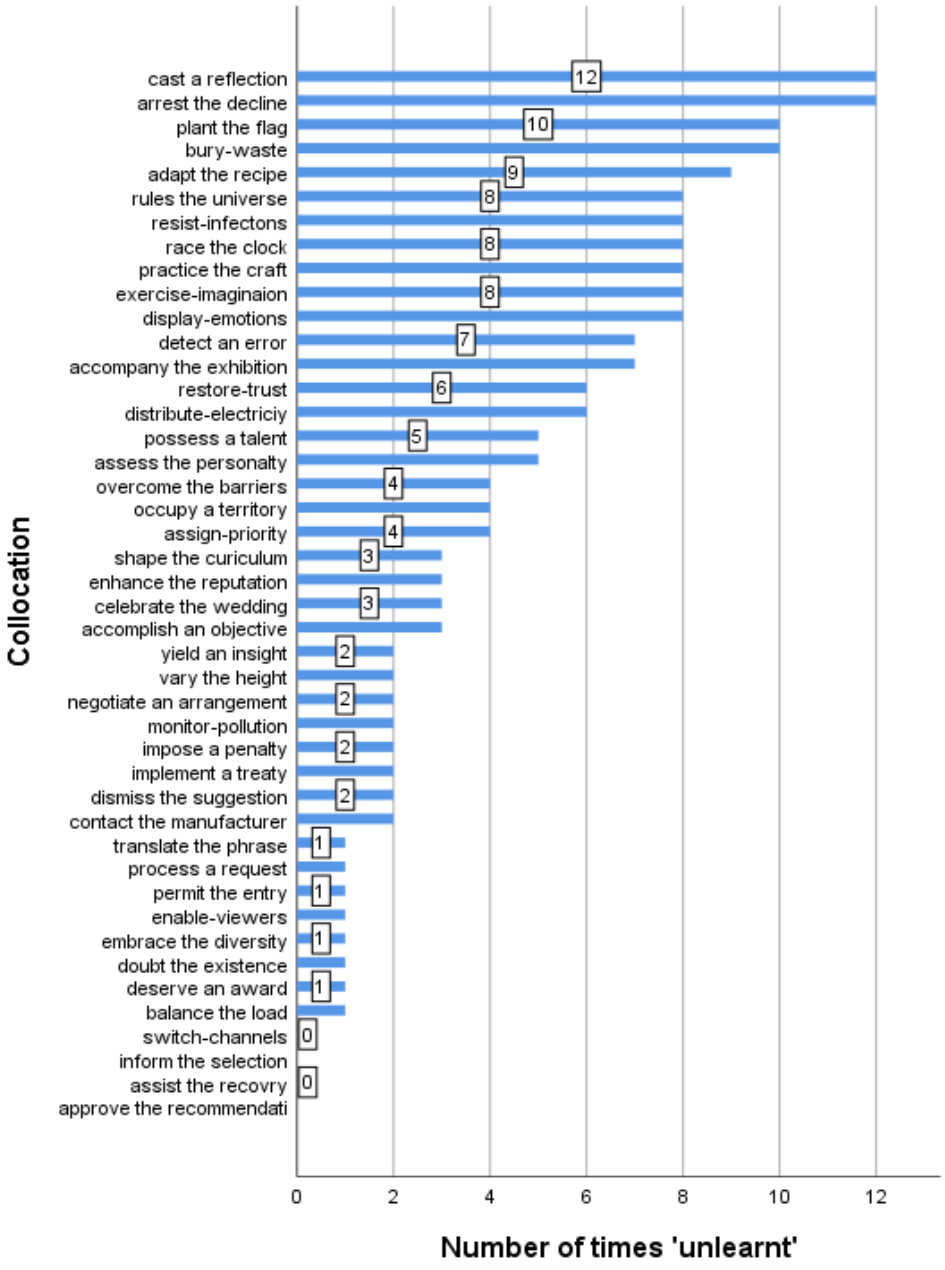


Figure 6.24: The frequency of each collocation that was 'unlearned' (correctly produced but not recognized)

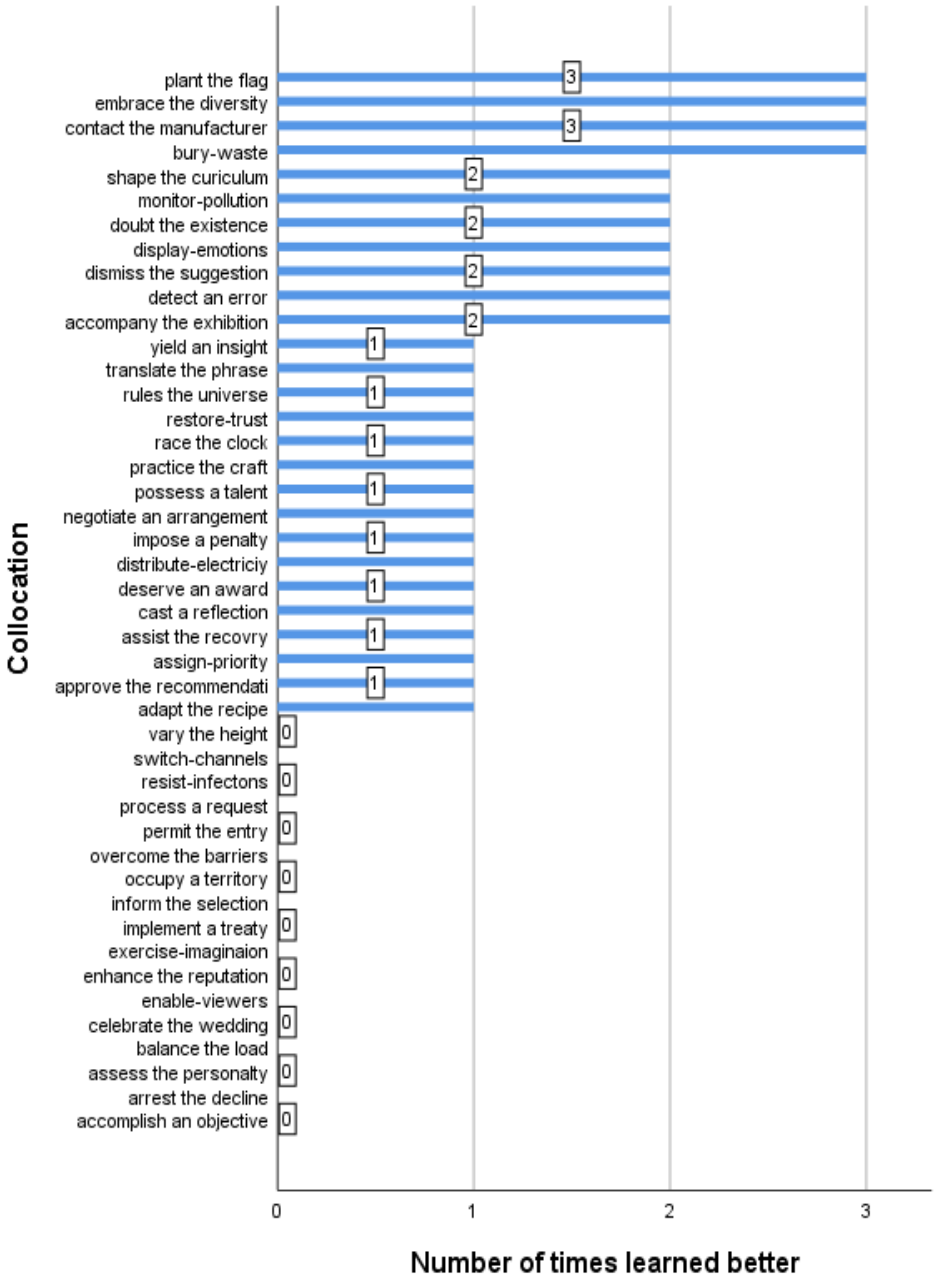


Figure 6.25: The frequency of each collocation that was ' learned better' (correctly recognized but not produced)

To graphically and statistically test this observation, Spearman's correlation was calculated, and a scatter plot was drawn (Figure 6.26). However, no significant correlation was found between the number of times a collocation was correctly recognized but not correctly produced and the transparency ratings of the collocations (r_s (42) = -0.18, p= 0.24).

On the other hand, the frequency of ‘unlearning’ collocations (i.e., when a student got a collocation correct in the production test but wrong in the recognition test) significantly correlated with the transparency ratings of collocations (rs (42) = -.79, p< 0.01). The scatter plot in Figure 5.26 illustrates this strong negative relationship between unlearned collocations and semantic transparency, indicating that the collocations that were most often forgotten or unlearned also tended to be those at the lower end of the human transparency rating scale. This suggests that the more opaque a collocation is, the more difficult it is to commit it to long-term memory.

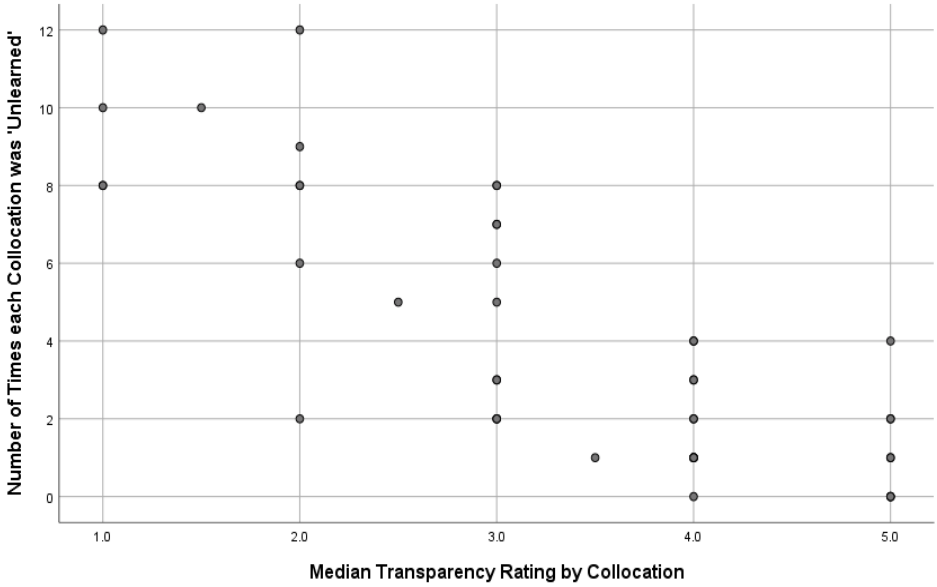


Figure 6.26: Scatter plot of number of times each collocation was ‘unlearned’ against transparency ratings

6.6.5 The relationship between computational measures and collocations learnability

The aim of the following analysis was to examine whether any of the five distribution-based semantic measures of collocations (see Chapter 5, Section 5.5.1, on how these measures were computed), similarly to human ratings, could correlate with how well L2 students learned the targeted collocations. Therefore, graphical representions as well as correlation tests were used to inspect the relationship between each of the five distributional similarity measures and the collocation learnability related variables, i.e., the production, recognition and overall learnability scores.

Figures 6.27 to 6.29 show three scatter plots representing the relationship between the verb-collocation similarity measure in the search pattern (1) (see Chapter 5,Section 5.5.1, for more detail on these search patterns) and each of the production scores, recognition scores and overall learnability scores of each collocation. Only a moderate association was detected between this type of similarity measure and the collocation learnability variables, as indicated by Spearman's correlation test results ($r_s(42) = 0.52$, 0.53 and 0.53, respectively, $p < .001$).

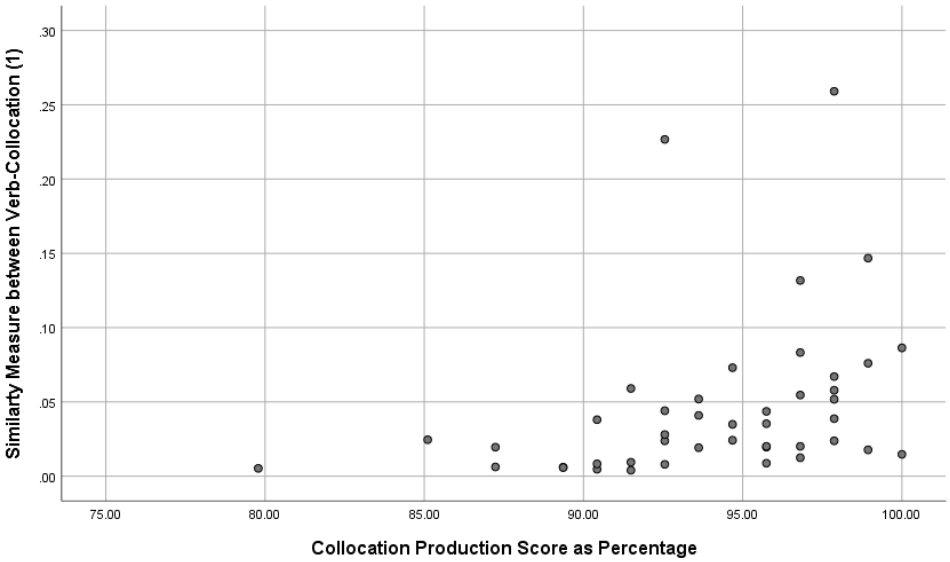


Figure 6.27: Scatter plot of verb-collocation similarity measures (1) against collocation production percentage scores

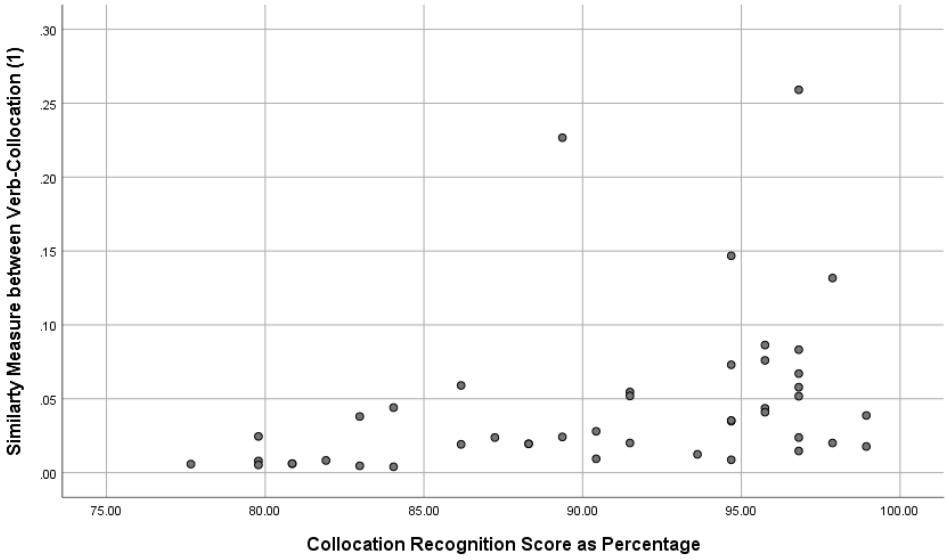


Figure 6.28: Scatter plot of verb-collocation similarity measures (1) against collocation recognition percentage scores

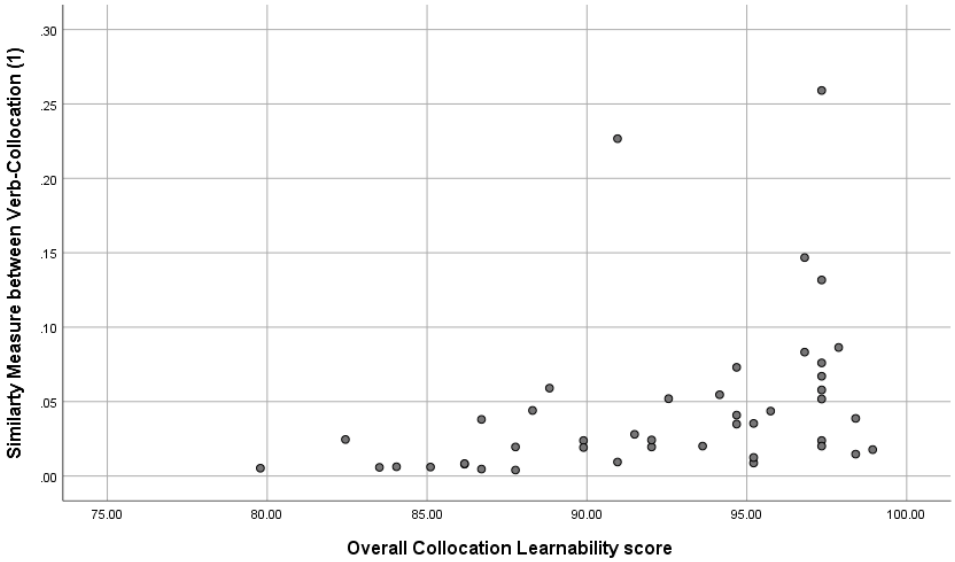


Figure 6.29: Scatter plot of verb-collocation similarity measures (1) against average percentage of collocation learnability across tests

The three scatter plots shown below in Figures 6.30 to 6.32 display the relationship between the verb-collocation similarity measure in search pattern (2) and how well collocations were learnt productively, perceptively and overall. The association between the verb-noun similarity measures (2) and each variable related to collocation learnability appears to be also one of medium strength. This was also revealed by the Spearman's computed coefficients ($r_s(42) = 0.54$, 0.56 and 0.55 , respectively, $p < .001$), which are very similar to those observed for the verb-collocation similarity in search pattern (1).

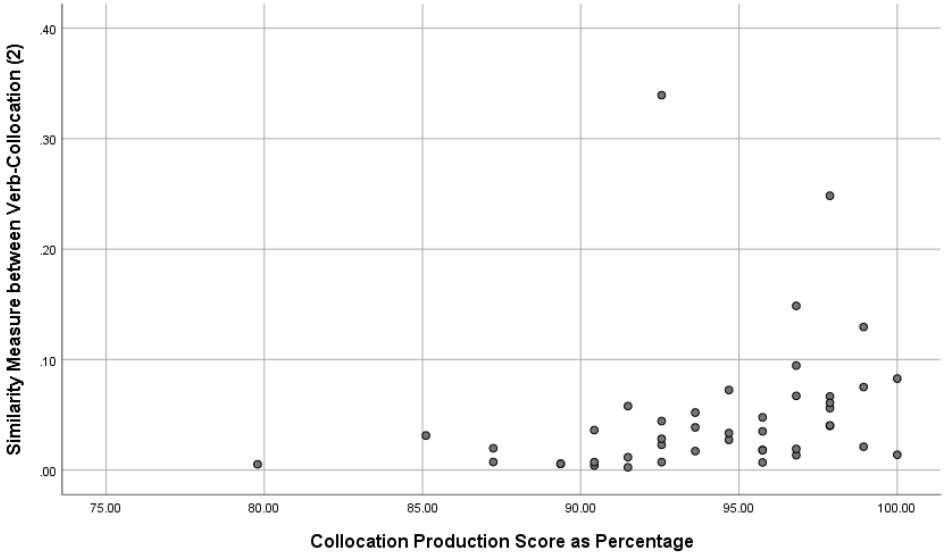


Figure 6.30: Scatter plot of verb-collocation similarity measures (2) against collocation production percentage scores

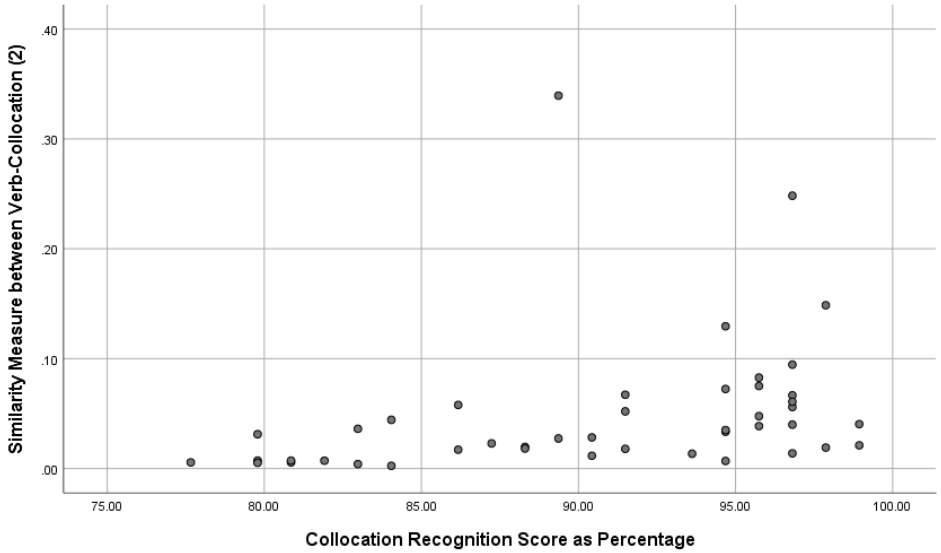


Figure 6.31: Scatter plot of verb-collocation similarity measures (2) against collocation recognition percentage scores

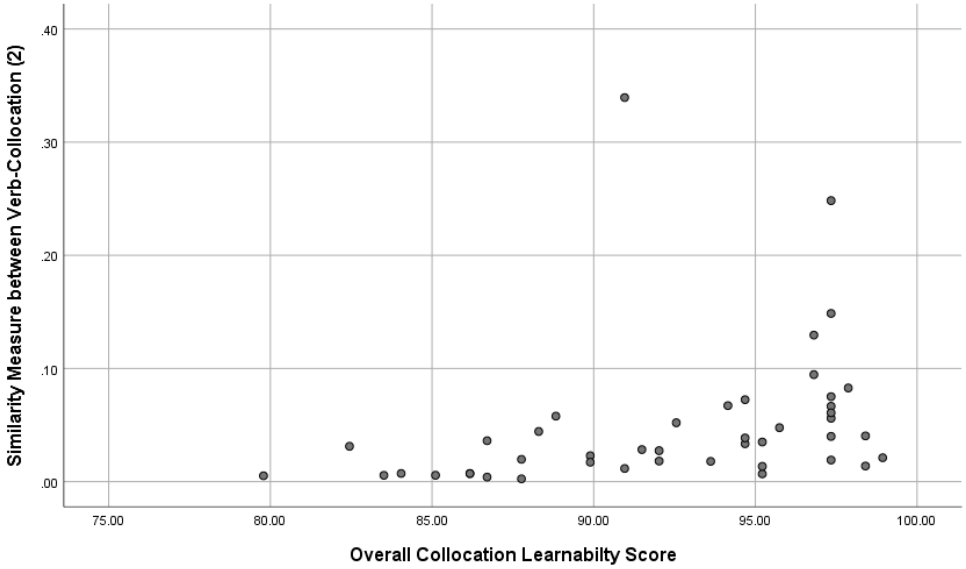


Figure 6.32: Scatter plot of verb-collocation similarity measures (2) against overall learnability of collocations

The relationship between the third examined similarity measure, i.e., the noun-collocation similarity measure in search pattern (1), and collocation learnability scores, is illustrated by the three scatter plots in Figures 6.33 to 6.5. These scatterplots (as well as the computed Spearman's correlation coefficients) reveal only a weak association between the distribution similarity of the noun to its collocation (1) on one hand and all three collocation learnability variables on the other hand. The correlation with collocation production scores,

collocation recognition scores and overall learnability was rs (42) = 24, p < .05, rs(42) = 26, p < .05, and rs(42) = 25, p < .05 respectively.

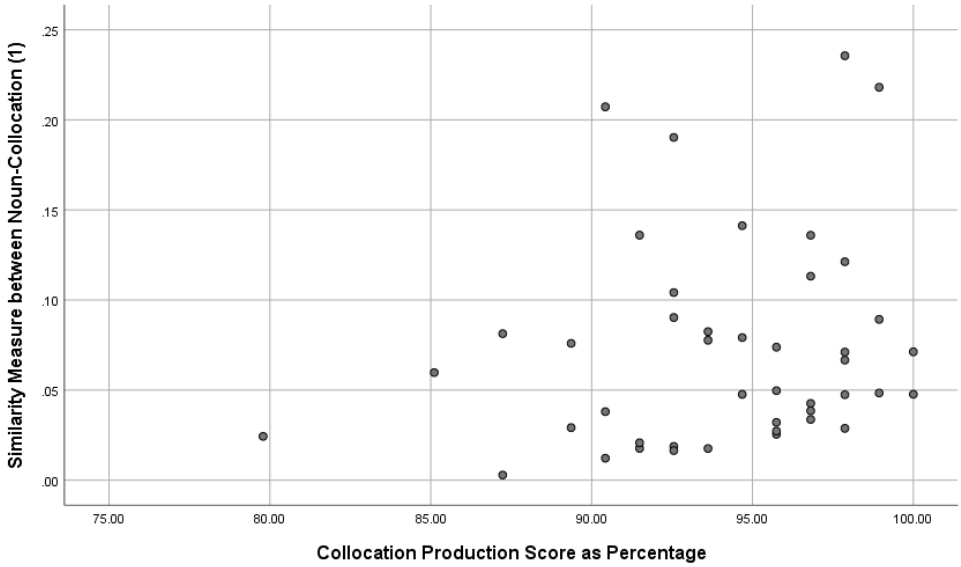


Figure 6.33: Scatter plot of noun-collocation similarity measures (1) against collocation production percentage scores

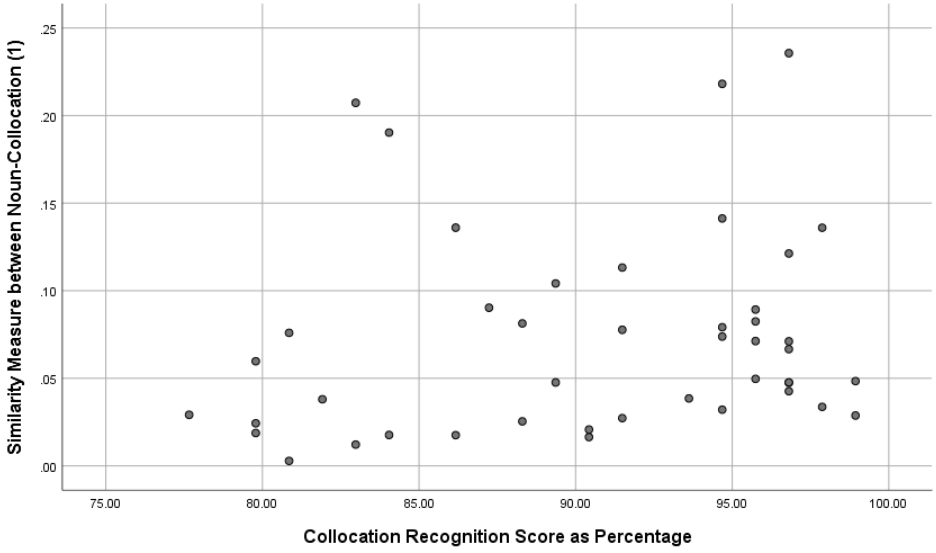


Figure 6.34: Scatter plot of noun-collocation similarity measures (1) against collocation recognition percentage scores

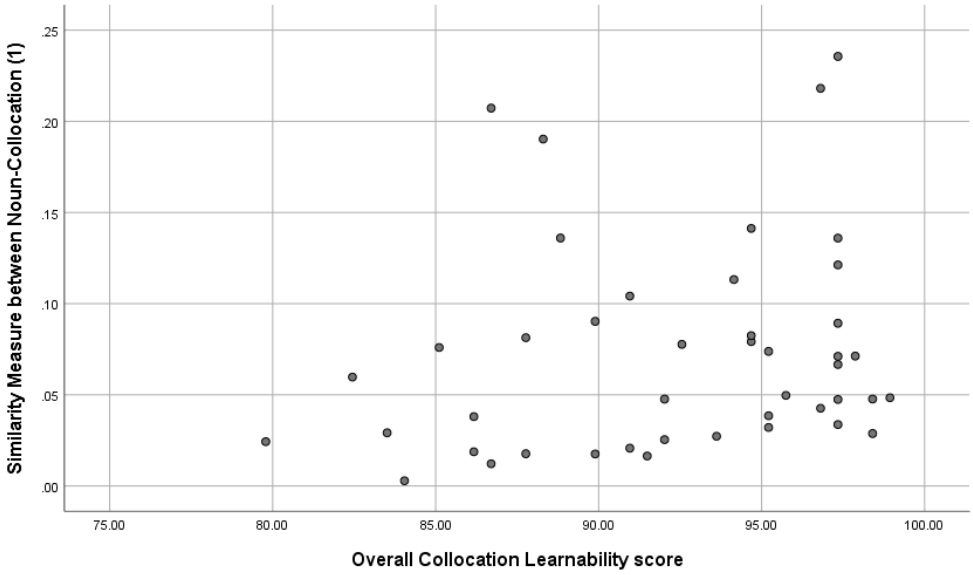


Figure 6.35: Scatter plot of noun-collocation similarity measures (1) against overall learnability of collocations

Figures 6.36 to 6.38 display the association between the noun-collocation similarity measures in search pattern (2) and the three collocation learnability scores. The first scatterplot (Figure 6.36) shows a weak correlation between noun-collocation similarity measures (2) and collocation production scores, also indicated by the Spearman's test values ($r_s(42)= 23$, $p < .05$). The second scatterplot (Figure 6.37) also exhibits a similar weak association between noun-collocation similarity measures (2) and collocation recognition scores ($r_s(42) = 26$, $p < .05$). Likewise, only a weak relationship was found between noun-collocation similarity measures (2) and overall collocation learnability, as shown in the third scatterplot (Figure 6.38) and the results of the computed Spearman's test ($r_s(42) = 24$, $p < .05$). These results demonstrated that noun-collocation similarity measures in both search patterns (1) and (2) were clearly alike in their weak correlational relationship with all collocation learnability scores.

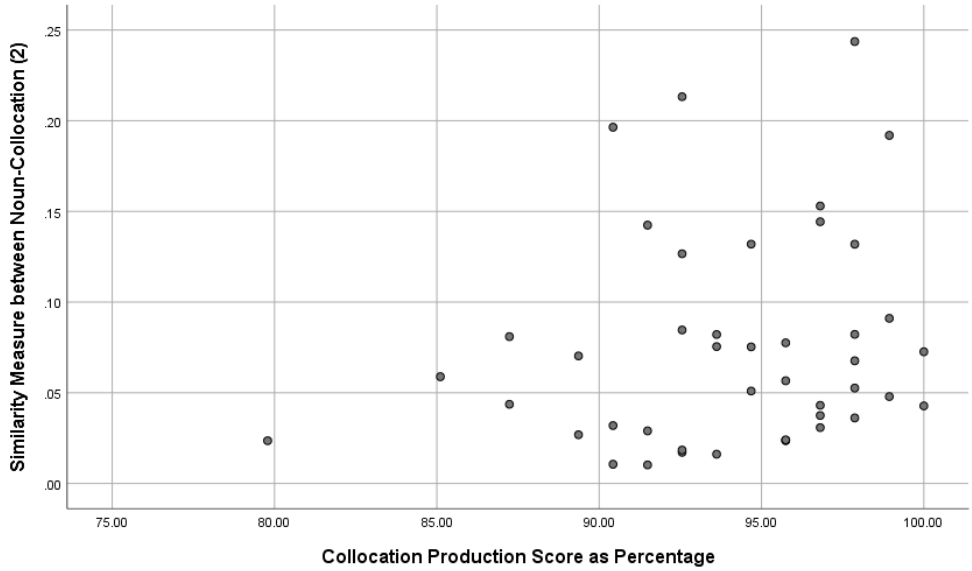


Figure 6.36: Scatter plot of noun-collocation similarity measures (2) against collocation production percentage scores

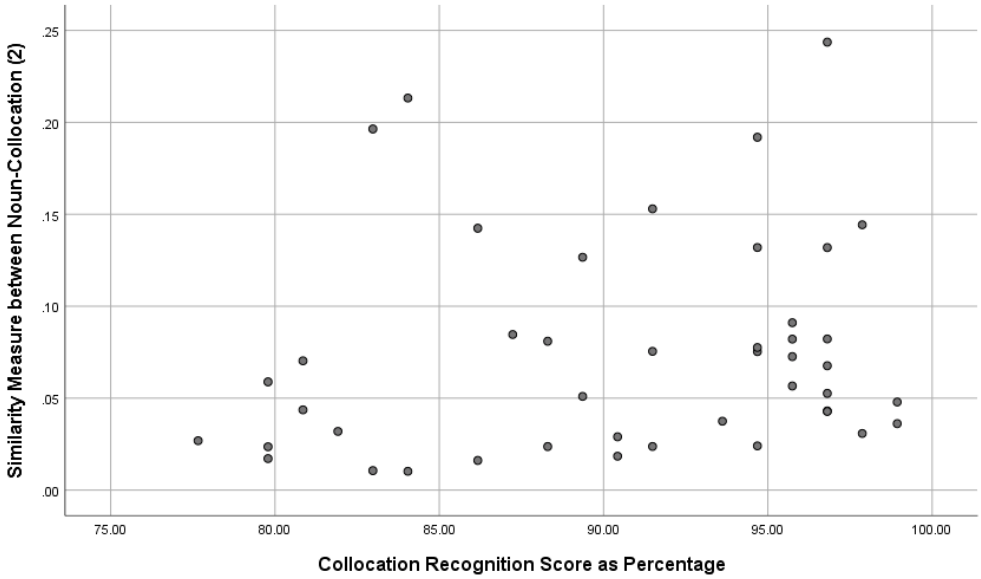


Figure 6.37: Scatter plot of noun-collocation similarity measures (2) against collocation recognition percentage scores

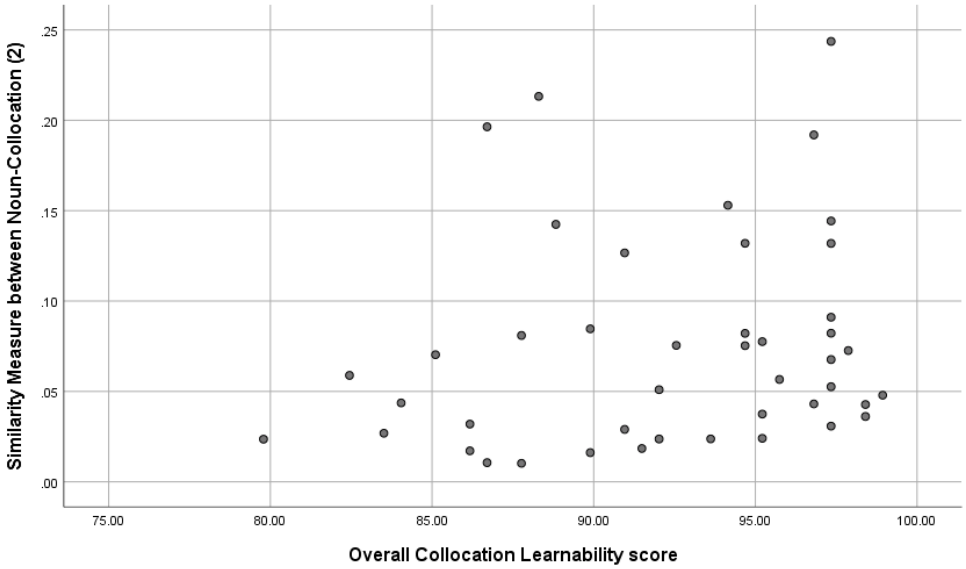


Figure 6.38: Scatter plot of noun-collocation similarity measures (2) against overall learnability of collocations

The fifth investigated distributional-based semantic measure is the verb-noun similarity measure. Its relationship with collocation learnability scores is illustrated by the three scatter plots below (Figures 6.39 to 6.41). All three scatter plots clearly demonstrate strong positive linear relationships between verb-noun similarity measures on the one hand, and each of collocation production (Figure 6.39), collocation recognition (Figure 6.40) and overall collocation learnability (Figure 6.41) on the other hand. The strength of these relationships was evidenced by the computed Spearman's correlation coefficients. The correlation strength for verb-noun similarity measures against collocation production was $r_s (42) = .84$, $p < .001$, while the correlation was even stronger between verb-noun similarity measures and collocation recognition $r_s (42) = .93$, $p < .001$. A very strong correlation was also found between verb-noun similarity measures and the overall learnability of collocations ($r_s(42) = .93$, $p < .001$). Thus, verb-noun similarity measures appeared to be the only one of the five examined distributional-based semantic measures to have a statistically significant and strong correlation with collocation learnability. This particular measure was also the one that strongly correlated with human ratings of semantic transparency (as evidenced in Chapter 5, Section 5.6.2).

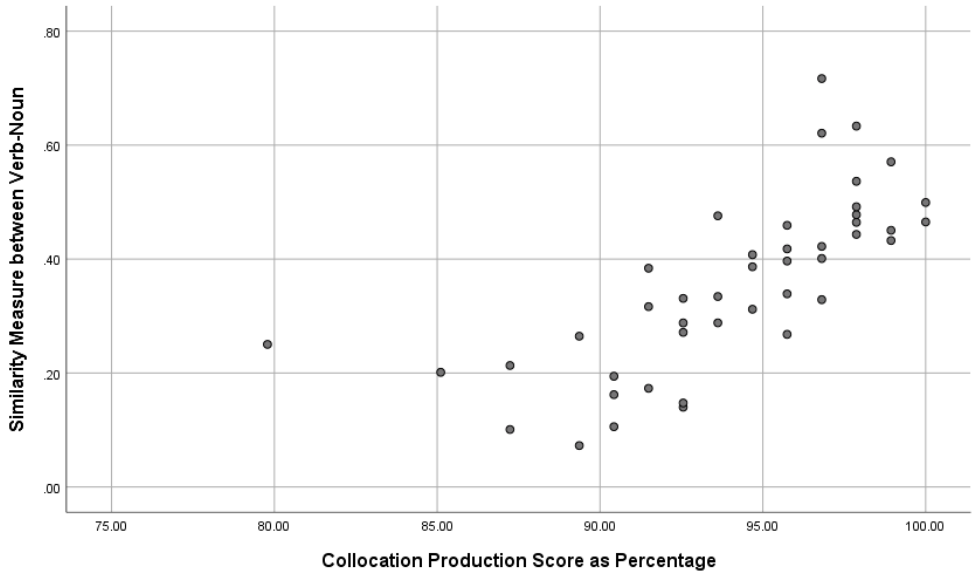


Figure 6.39: Scatter plot of verb-noun similarity measures against collocation production percentage scores

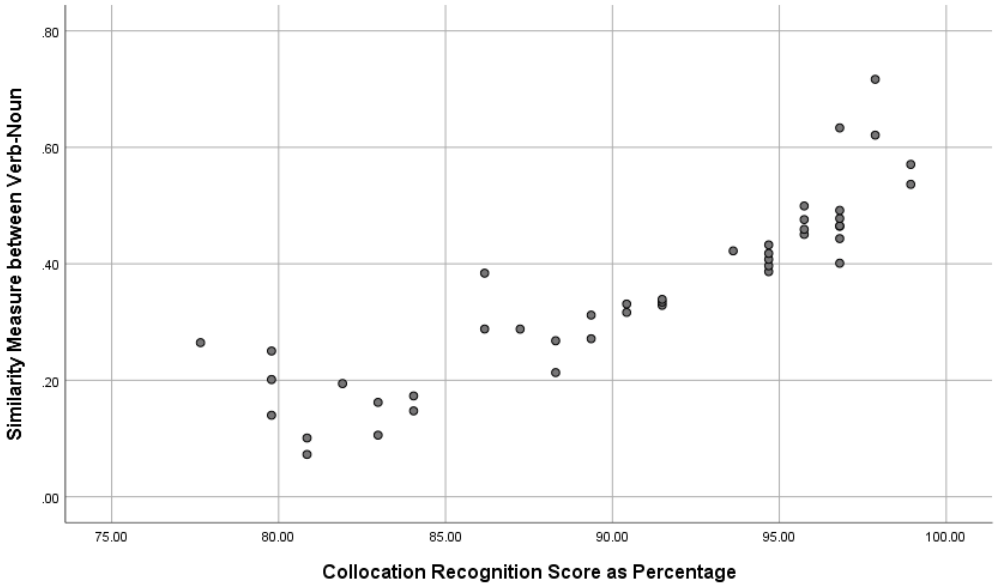


Figure 6.40: Scatter plot of verb-noun similarity measures against collocation recognition percentage scores

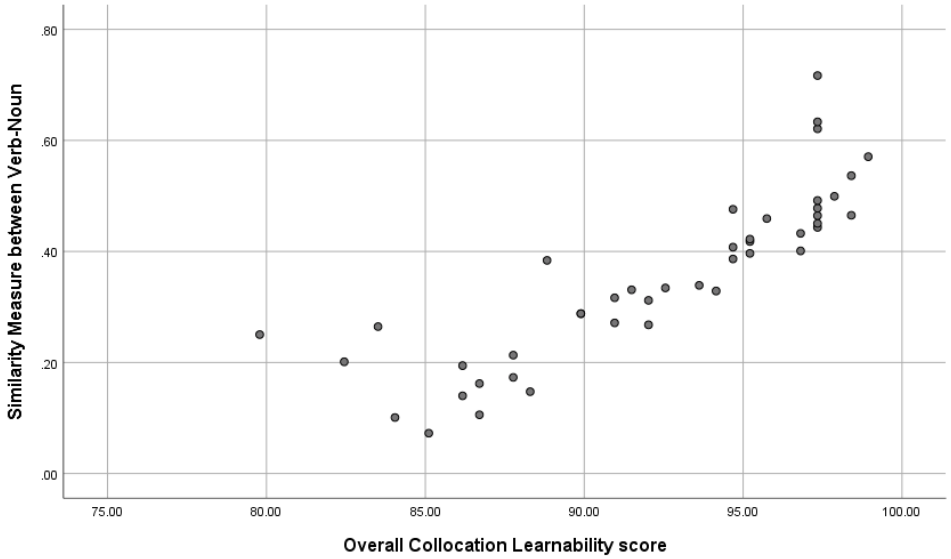


Figure 6.41: Scatter plot of verb-noun similarity measures against overall learnability of collocations

6.7 Discussion

The present chapter has looked into the impact of the relative degree of semantic transparency on the learnability of L2 collocations. The analysis of L2 students' performance on two tests, which were taken after their undergoing a training course on a set of collocations, provided compelling evidence of a strong and significant effect of semantic transparency on the learnability of L2 collocations. The higher the degree of semantic transparency of the collocation, the more easily it was learned by L2 students and vice-versa. Collocations with high levels of semantic transparency, such as *switch channels*, *accomplish an objective* and *occupy territory*, were learned better than those with lower levels of semantic transparency, such as *resist infection*, *display emotion* and *bury waste*. Thus, it was clearly demonstrated that the extent to which L2 collocations were easier or more difficult to learn was correlated with their degree of semantic transparency. Although correlation *per se* does not provide any evidence about causation, the tightly controlled nature of the present study makes it reasonable to infer that ease of learnability depended at least partly on the level of semantic transparency.

Such findings confirm evidence found in the few studies on collocation transparency (e.g., Huang, 2001; Revier, 2014; Macis and Schmitt, 2017; Gyllstad and Wolter, 2015) as well as previous studies on compounds (e.g., Mayila, 2010) and idioms (e.g Liao and Fukuya, 2004). However, the evidence provided here is stronger than that of these previous works because it involves a much more tightly controlled experiment. In other words, the present study is consistent with these previous studies in showing semantic transparency as a key factor influencing L2 collocational acquisition but goes further than previous studies by (1) controlling for congruency; (2) controlling for prior knowledge; (3) establishing the semantic transparency of the items with more reliable methods; (4) implementing the same effective instructional approach for all targeted items; and (5) employing statistical testing. Therefore, the evidence provided here can be considered much stronger and more reliable because of the efforts that were taken to control for potential confounding variables which could affect the validity of the results. Most importantly, the present study provides evidence of a strong statistical correlation between semantic transparency and collocation learning ($r_s(42) = .93$, p-value < 0.01). In contrast, no previous collocation study has used statistical correlations to quantify the impact of semantic transparency on collocational knowledge, with the exception of Revier (2014), who found only a weak correlation ($\tau = .27$) between semantic transparency and item facility.

Adding to the trustworthiness of the findings in the present intervention is its employment of two test formats and two methods of establishing the semantic transparency of collocations. In order to more reliably measure the outcome of learning, it is advisable to use more than one test or test format. This, according to Webb (2019), is “particularly important as one instrument alone is often not sensitive enough to detect minimal changes in the incremental learning of vocabulary knowledge aspects” (p.411). In the present study, two tests were used, each with a different format, which makes the results obtained concerning

the students' learning gains and the effect of semantic transparency on collocation learning more trustworthy. Moreover, the validity of these results was enhanced by data triangulation, since two methods, viz, human ratings and distributional-based semantic measures, were employed to establish the semantic transparency of collocations in this study. These two methods were found to significantly correlate with each other (see Chapter 5, Section 5.6.2), and the varying degrees of semantic transparency obtained by both methods were also found to be strongly associated with collocation learning.

While the statistical analysis conducted here does not, in itself, provide any evidence about causation, it can be deduced from the experimental design that variation in semantic transparency was a likely explanation for variation in learnability. This is because less semantically transparent collocations were less well learnt, even though they were all congruent, taught by the same method and previously unknown to the learners, hence equally frequent in their experience and acquired at the same age. The design of the experiment involved attempting to rigorously control for possible confounding variables that might mimic an effect of transparency, through all phases of the experiment. To the extent that this attempt was successful, it seems likely that the variation in the semantic transparency levels of the collocations is what made them more or less difficult to learn.

An important result of this study pertains to the finding that collocations which were congruent to the learners' L1 were still more difficult to learn if they were less semantically transparent. Several studies in the field have consistently documented that congruent collocations which have translational equivalents in learners' L1 were easier to learn than incongruent ones. This could be because learners need only transfer the already acquired lexical information about the conceptual meaning of a certain unit to the L2. Accordingly, it could be argued that all congruent collocations would not be so difficult to learn and would be all learned at an equal pace. However, the results of this study indicated that, even when

all collocations were congruent, there was still clear evidence for an effect of semantic transparency on collocation learnability. Psycholinguistic research on L1 speakers has shown that reduced semantic transparency negatively impacts L1 speakers' processing speed of complex words (e.g., Libben et al., 2003; Juhasz, 2007). In addition, Gyllstad and Wolter (2016) provided empirical evidence suggesting that the processing of L2 collocations is influenced by their degree of semantic transparency. Thus, it might be argued that semantic transparency is an important factor that should be taken into account in the teaching and learning of collocations regardless of their congruency status.

In line with the hypothesis put forward in Section 6.1, more opaque collocations were harder to learn than more transparent ones. One plausible explanation for this is related to Wray's (2002) speculation regarding how L2 learners approach the target language. She claims that adult L2 learners, irrespective of their level of accuracy in grammar or knowledge of vocabulary, tend to interpret multiword expression literally as they have an inclination to see collocations as combinations of separate items (p.210). This could lead to misinterpretations and hinder learnability, especially for collocations with lower semantic transparency, since the meaning of such collocations is not simply the sum of the meanings of their separate items but more likely reflects a holistic meaning that transcends the added-up meaning of the two component words. This is clearly mirrored in the comments of the raters in this study, discussed in Chapter 5, who ranked targeted collocations for their degrees of semantic transparency. They perceived less transparent collocations such as *plant a flag* and *race the clock* as complex in meaning and as operating beyond the simple adding of the core meanings of component words of a combination, whereas the meaning of other collocations such as *translate a phrase* and *approve a recommendation* were perceived as straightforward and composed by adding up the literal meaning of the component words (for more detailed discussion on the raters' comments, see Chapter 5, Section 5.7). Wray's (2002) claim was

empirically supported by Tiv et al. (2019), who found evidence indicating that L2 learners, in contrast to native speakers, were more inclined to interpret multiword combinations literally, in this case, verb particle constructions (VPCs) or phrasal verbs.

Further supporting evidence for Wray's claim is illustrated in the findings of Barfield (2007), who found that individual verbs and nouns were better recognized than verb + noun collocations. Accordingly, he concluded that learners store lexical items individually rather than as combinations (p. 342). The tendency of L2 learners to view opaque expressions as rather more transparent and to fail to recognize their lower semantic gradation is also supported by Blais and Gonnerman (2012). Comparing native speakers to L2 speakers of English with French L1 in their judgment of the semantic similarity between verbs and their corresponding phrasal verb constructions (e.g., the semantic similarity of the verb *throw* to its corresponding phrasal verb construction *throw up*), they found that L2 speakers were less sensitive than native speakers in their perception of the semantic similarity between verbs and phrasal verb constructions that were classified as relatively more opaque. Although L2 speakers' semantic judgment improved with increased proficiency, it did not reach native speaker levels. In the present study, it is possible that the L2 learners' difficulties with the learning of less transparent collocations is attributable to a tendency to construct literal meanings for opaque expressions. Of course, further evidence is needed to confirm such a claim with respect to how exactly L2 learners store and interpret more or less semantically transparent combinations in their mental lexicon.

In the present study, the effect of semantic transparency on the learnability of L2 collocations showed a 'stair-step' pattern, in which collocation learnability gradually improved as the level of semantic transparency increased. Barfield (2007) and Revier (2014) are examples of two studies which confirm such a finding. In a qualitative analysis (interviews) of three learners' collocation learning process during an English course, Barfield

(2007) concluded that "L2 collocation transparency is an important part of initial L2 collocation development" (p.343). In agreement with this, Revier (2014) maintains that "development, knowledge, and use of transparent collocations is a pre-condition for the subsequent development, knowledge, and use of less transparent or more opaque collocations" (p.157).

Not all previous work is in line with the specific finding in the present research that the more semantically opaque a collocation is, the more it is difficult to learn. For instance, Nesselhauf (2005) initiated a commonly upheld claim in the collocation literature, which maintains that semi-transparent collocations (referred to as partially restricted collocations) are in the semantic category of collocations that pose the greatest challenge to L2 learners (see Chapter 3, Section 3.4.1), as opposed to transparent and non-transparent collocations (referred to as non-restricted and fully-restricted collocations respectively). The reason why semi-transparent collocations have been argued to be harder to acquire is related to their being "deceptively transparent" (Gyllstad, 2007, p.271). It has been claimed that, because the words in such collocations are usually frequent and known to them, L2 learners often fail to notice that the meaning of these words when they combine to form a collocation (i.e., which seem deceptively transparent in meaning) becomes more specialized or simply different from their meaning as single words. This in turn causes misinterpretation and hinders their acquisition.

However, the results of the present study, as well as those by Revier (2014) and Huang (2001), refute Nesselhauf's (2005) claim and provide clear evidence that the learning of collocations positively increases as their levels of semantic transparency increase. In Revier's study, a developmental pattern similar to the one found in this study was detected; however, it fluctuated across the three pre-categorized levels of semantic transparency, viz, transparent, semi-transparent and non-transparent collocations. He found that "collocation knowledge

appeared to be characterized by a binary separation, with transparent collocations being clearly better known than semitransparent and non-transparent collocations" for the intermediate learners (p.261). With respect to advanced learners, there was a gap in knowledge between transparent collocations on the one hand and semi-transparent and non-transparent collocations on the other, as there was no difference in knowledge between these two lower transparency levels of collocations. A clearer stair-step profile was identified by Huang (2001) when he compared L2 learners' collocational knowledge of four types of collocations—free combinations; collocations; figurative idioms; and pure idioms—representing ascending levels of semantic opacity. Nevertheless, findings by Revier (2014) and Huang (2001), in addition to those found here, lead to the strong postulation that L2 collocational knowledge development is characterized by gradual growth, in which collocations with low levels of semantic transparency are the first and most easily learned type of collocations, whereas more opaque ones probably need more time to be fully acquired.

Still, it is important to point out that the claim that semi-transparent collocations are the hardest type to acquire cannot be completely dismissed, based on the findings in this study. This type of collocation is claimed to be challenging due to the high frequency of its component words concealing the holistic meaning of the collocation at phrasal level. However, all the words in the collocations in this study were completely new to the targeted students and therefore not frequent in their experience. Consequently, none of the collocations here could have been problematic or 'deceptively transparent' due to the high frequency of their individual words. It is equally important to mention a methodological flaw in the studies that have claimed that semi-transparent collocations are most difficult to learn (e.g., Martinez and Murphy, 2011), namely their failure to pretest the learners' prior familiarity with the collocations. It is also possible that learners' lack of awareness of the

combinatory relation existing between words already known to them is the reason why these semi-transparent collocations were hard to acquire, and not their degree of semantic transparency.

One of the interesting findings in this study is that semantic transparency was found to correlate more strongly with collocation recognition ($r_s(42) = .94$, p-value < 0.01) than with its production ($r_s(42) = .84$, p-value < 0.01), a finding that is more likely connected with the relative impact of semantic transparency over time. As none of the existing studies has compared the recognition and production of collocations with varying degrees of semantic transparency, this finding cannot be linked to results of other research in the field, and its relevance cannot be assessed beyond the present context. However, it is important to note that the recognition test was administered a week after the production test and the correlational analysis indicated that the collocations that were most often unlearned also tended to be the ones with lower semantic transparency. This suggests that when a collocation is more opaque in meaning, it is less likely to be well retained over time. This in turn could partially explain the higher correlation that was found between semantic transparency with collocation recognition compared to its production. Consequently, it could be argued that semantic transparency is more predictive of the longer-term learning of collocations.

It is well attested in most previous research into L2 collocation acquisition that its production lags behind its recognition (e.g., Zughoul and Fattah, 2003; Koya, 2005; Jaén, 2007), which is also the general developmental pattern in most aspects of language learning. However, the analysis in this study revealed a surprising result as the productive learning of collocations was found to slightly surpass its perceptive learning. There are several potential interpretations of why the learners in this study performed better in the test designed to assess production skill than the test designed to assess recognition. The first reason, as mentioned above, could be related to the fact that the recognition test was administered a week later than

the production test and delayed testing has been constantly shown to affect the size of the learning gains. According to Peters (2014), “scores will probably be lower when the first posttest is not administered immediately but later after the learning treatment, given that most forgetting occurs initially after learning; this is called ‘the forgetting curve’” (p. 80). The second reason is related to the different formats of the two employed tests. Empirical evidence from previous research emphasizes the significant role of contextual information in supporting the comprehension of complex words with lower levels of semantic transparency (e.g., Gibbs,1991; Levorato,1999). The tested items in the recognition test here appeared as decontextualized. In contrast, context sentences were provided for all items in the production test. This might have aided the decoding of the meaning of items in the production tests, whereas the support of contextual information was absent in the recognition test, making it more challenging for L2 learners.

The third explanation as to why collocation production appeared slightly better than recognition is concerned with the format of the productive test employed in this study. This test was adapted from Revier (2014), who used a multiple-choice format, a common format in tests of receptive knowledge (as discussed in Section 6.5.1). Although Revier attempted to provide evidence of the test’s productive quality, he acknowledged that “[a]lthough some empirical evidence has been mustered in support of this argument, I must inevitably conclude that the productive quality of the CONTRIX requires further investigation” as the evidence was “based on [a] data set that is not only small but possibly also less than reliable” (p.194). This suggests that the test used in the present study to test production may actually have been tapping into the receptive ability to recall meaning rather than the productive ability to recall form. If so, it is not surprising that L2 students performed better in a test measuring their receptive collocational knowledge (originally designed to measure production) shortly after

they completed their training course, compared to the delayed receptive test (i.e., the designed recognition test) completed a week later.

The fifth possible reason for the extremely high scores of the production test compared to the recognition scores is likely connected with the generous marking scheme adopted in the former test. In that test, the accurate selection of the verb and noun from the options to compose the right collocation to fit the context sentence was the only condition for an answer to be marked as correct. Even though the test required the selection of either the correct article or zero article, this was not taken into account in the marking of the test. Thus, it can be speculated that, had the scoring taken into account the use of articles, the analysis would have reflected a bigger spread of results and the scores would not have reached the upper ceiling to the extent they did (see Section 6.5.1 for the scoring system of the production test). A related issue pertains to the often-observed avoidance behavior to which L2 learners resort when their collocation production is tested (e.g., Farghal and Obiedat, 1995). Much of collocational research that documents learners' problems with collocation production has either examined their free written production in learners' corpora or used translation tests. These testing formats allow for the emergence of the observed avoidance behavior toward collocation production. However, the test format employed in the present study did not allow for such avoidance tendencies, as it offered alternatives from which the learners had to choose the correct words to make up the collocation. Consequently, the production of collocations in this study might not reflect the true magnitude of learners' real production problems as manifested by their avoidance behavior. It is also important to note that the difference between collocation production and collocation recognition was only marginal. A more noteworthy finding reported in this study is that a statistically significant association was found between collocation production and recognition. This indicates that the learning of

collocations developed in a parallel pattern. Moreover, the semantic transparency effect was observed in both dimensions of collocational knowledge.

The findings in this study can be considered an important addition to the body of research attesting to the usefulness of explicit instruction in promoting collocation learning. Moreover, the outcome of the instructional intervention implemented here looks even more promising compared to previous pedagogical intervention studies, indicating the effectiveness of the explicit teaching of collocations. Extremely high learning gains of collocations, irrespective of their degree of semantic transparency, were found as a result of the intensive explicit teaching treatment, in which the average overall learning gains reached (92 %) of the target items. This high level of learning was maintained for both the recognition and production of collocations (the average productive and perceptive learning gains were (94%) and (90%) respectively). These learning attainments exceed those reported in past explicit instructional studies. For instance, learners in Liou & Chen (2018) learned the targeted collocations with a success rate of approximately (60%), while in Peters (2015), learners' productive learning gains were about (40%), and the receptive ones were (75%) of the collocations taught. The learning gains reported in incidental learning (implicit learning) studies are much lower than those in explicit-focused teaching studies. Webb et al. (2013), for example, found that incidental learning led to a learning improvement of (15%) in collocation production and (45%) in recognition. The large learning gains observed in the present study emphasize the positive impact of explicit instruction in promoting the learning of collocations and lend further and more reliable evidence to the growing body of research advocating explicit teaching as the optimal approach for collocation instruction. One of the most significant contributions of this thesis is the fact that it is the first study on the acquisition of L2 collocations that has properly controlled for prior knowledge of the tested collocation (i.e., prior familiarity with the constituent words as well as the whole collocation).

It is worth noting that the high positive learning gains observed in this study may suggest that the collocations were learned more efficiently than they actually were. The two collocation tests employed were designed to measure productive and perceptive knowledge of collocations, and both only intended to assess collocation knowledge with respect to the form-meaning link. In other words, these tests provide only a partial evaluation of what might actually be known about the collocations. This is because the tests are not sensitive enough to measure deeper and other aspects of knowledge that could be revealed in other tests formats, such as those that tap into implicit knowledge or free recall tests that require spoken or orthographical knowledge of collocations. Therefore, it is debatable whether the implemented tests reflect all the learning gains of collocations. However, they undoubtedly show whether or not learners have gained knowledge in the form-meaning link, which is an essential aspect of collocation knowledge.

In light of the demonstrated positive effect of explicit teaching in this study, it is worth reviewing the adopted explicit activities that have been useful in accelerating the learning of collocations. Explicit teaching was implemented mainly by providing learners with multiple opportunities to repeatedly encounter, i.e., notice, the targeted collocations during a presentation stage (that involved explicitly explaining their meaning and use), as well as to retrieve them during a practice stage. All collocations were encountered (embedded in context sentences) three times during the presentation stage and three to four times during the practice stage. Due to considerable differences in the available research findings, it is difficult to pinpoint the exact number of encounters needed for the learning of collocations. Webb et al. (2013) found that 15 encounters in a reading text were sufficient for the incidental learning of collocations with previously familiar constituent words. In contrast, Pellicer–Sánchez (2017) reported that increasing the frequency of encounters of collocations in reading texts did not greatly improve their learning.

However, as Nation (2001) has stressed, “it is not simply repetition which is important but the repeated opportunity to retrieve the item which is to be learned” (p. 67). Along these lines, Peters (2014) emphasizes that “[the] form–meaning link of a lexical item may be strengthened if that item is subsequently (and almost immediately) retrieved during another vocabulary activity” (p.91). He found that three to five repeated encounters with collocations in explicit activities could lead to larger learning gains than one encounter; however, his findings might be questionable due to a number of methodological limitations. Nevertheless, the findings of the present study, which attempted to overcome such methodological problems, consolidate those of Peters (2014), suggesting that five to six encountering opportunities (including four retrieval opportunities) might be sufficient for the successful learning of new collocations.

In this study, teaching the targeted collocations involved using explicit activities that focused on presenting and testing a collocation as an intact structure, as well as exploiting typographic highlighting and L1 translations to maximize learning. All practice activities were intended to elicit the targeted collocation as a whole structure as such activities have been shown to be more effective than those that elicit only one part of the collocation (e.g., Boers, et al., 2014; Boers, Dang and Strong, 2017). Moreover, translating the meaning of the collocations into the students’ L1 seemed to facilitate their learning, which confirms past research findings (e.g., Webb and Kagimoto 2009, 2011; Boers, Dang and Strong, 2017). The visual saliency of the targeted collocations was also highlighted by having them appear in bold red font. This was another applied practice that might have assisted the learning of collocations, as evidenced in recent interventional studies (e.g., Choi, 2017; Sonbul and Schmitt, 2013). Overall, the high learning gains seen in this study indicate that the implementation of such explicit-oriented practices were extremely useful in promoting the learnability of collocations. However, as emphasized by Schmitt (2008), “virtually anything

that leads to more exposure, attention, manipulation, or time spent on lexical items, adds to […] learning" (p.340).

The findings also shed light on two other important factors that have been acknowledged to influence collocation learning: learners' proficiency level; and collocation type. It has been widely assumed that collocational knowledge is "an advanced form of lexical competence" that only highly proficient learners are capable of achieving (Revier, 2014, p. 265; Milton, 2009, p168; Schmitt, 2010, p.224). This assertion was mostly based on evidence from corpus or cross-sectional studies that attempted to assess learners' collocational knowledge without conducting any instructional intervention. The results of this study are encouraging here, as they demonstrate that, even at low levels of proficiency, L2 learners were able to develop their collocational competence to a considerable extent.

The study also offers a promising finding concerning the learning of verb + noun collocations. It has been suggested that this particular type of collocation is the most difficult type to learn compared to others, such as adjective + noun collocations (e.g., Nesselhauf, 2003; Laufer and Waldman, 2011; Boers et al., 2014; Peters, 2015). Two hypotheses have been offered to explain why learners often struggle with verb + noun collocations. Firstly, as pointed out by Peters (2015), "verb–noun collocations show more variation in morphology compared to adverb–adjective or adjective–noun collocations because of inflections such as number, tense, aspect and person" (p.115). Secondly, it has been argued that the difficulty of verb + noun collocations is related to the verb meaning, which is claimed to offer relatively little contribution to the meaning of the whole collocation (see Nesselhauf, 2003; Boers et al., 2014; Peters, 2015). However, as can be seen from the present study, it is not only the noun constituent that carries the semantic weight of the whole collocation; rather, both the verb and the noun contribute to the meaning of the whole construction, though not necessarily equally. The fact that the learners in this study were able to successfully learn such a notoriously

challenging type of collocation, with varying degrees of semantic transparency, suggests that the successful learning of verb + noun collocations can be promoted by more effective classroom instruction. However, this study also indicates that the semantic transparency of verb + noun collocations should be taken into consideration, as it contributes significantly to the extent to which they are relatively easy or difficult for L2 learners to learn. The analysis has also shown that both human ratings and measures of distributional similarity between the verbs and nouns of collocations significantly correlated with collocation learnability. Learning collocations which are perceived as exhibiting a reduced semantic transparency were harder than those judged by native speakers as more transparent. Similarly, the learning of collocations with a higher semantic similarity between their component verb and noun seems to be easier than learning those with less semantic similarity between their constituents. These findings have significant pedagogical implications for L2 pedagogy in general and curriculum design in particular, as discussed below.

In recognizing the significant effect of semantic transparency, as seen here, on the learning of L2 collocations, both L2 teachers and educators would benefit from having an adequate method that could assist in categorizing collocations based on their degree of semantic transparency. This would help them predict which ones are more likely to be difficult to learn for L2 students, and hence needing extensive explicit focus in L2 classrooms. The results of the present study suggest that distribution-based measures, i.e., the distributional similarity between the component words of a collocation, can be used interchangeably with human transparency ratings to estimate the relative semantic transparency of collocations. However, the former can be considered superior to the latter in terms of cost-effectiveness and practicality. It is also well recognized that human transparency ratings are prone to subjectivity and variation in the rater's judgment of semantic transparency, unless these ratings are averaged over multiple participants (Wang et

al., 2014). However, obtaining pooled human transparency ratings can be costly, as well as effortful and time-consuming. Distributional-based semantic measures offer a more practical and cost-efficient means to automatically quantify the relative semantic transparency of a set of collocations. This is because the semantic transparency of a large number of collocations can be automatically computed by a single person in a short space of time. Such measurements could then be widely disseminated to L2 teachers and course designers. The availability of published lists containing a very large number of collocations which are classified according to their semantic transparency level could also be useful for L2 classrooms, and especially for non-native L2 teachers who cannot rely on their intuition as native speakers to judge the relative semantic transparency of collocations and hence to know which collocations deserve more explicit teaching. In fact, there is agreement that "the precise mechanisms that drive native-speaker judgments of degrees of idiomaticity appear to be very complex and largely unconscious, yet highly consistent" (Martinez, 2013, p.193). Distribution-based semantic measures would be a consistent, objective method that could be employed to establish the semantic transparency of numerous collocations which could be made widely available and readily exploited in many L2 classrooms. This in turn would undoubtedly enhance the teaching and the learning of L2 collocations to a great extent.

7 General Discussion and Conclusion

7.1 Introduction

The central question this study has sought to address is to what extent the degree of semantic transparency of English collocations affects their learnability by EFL learners, both in terms of recognition and production, when prior familiarity is controlled for. Another question the study has aspired to answer is whether or not collocations can be explicitly taught. A further aim has been to find out whether distributional measures can be used to estimate the semantic transparency of collocations, and the feasibility of using this method and/or human ratings of transparency to predict the collocational learning gains of L2 learners and subsequently as a basis for selecting collocational items to teach. In this chapter, the answers to these questions are summarized and considered as follows. Section 7.2 includes a general discussion of the preceding chapters and outlines the key findings that represent the essential contributions of this thesis in the three main areas below:

(i) The effect of semantic transparency on the learnability of L2 collocations;

(ii) The teachability of L2 collocations;

(iii) The assessment of the semantic transparency of collocations.

In Section 7.3, the implications of these findings for L2 research and teaching are considered, and a number of recommendations for L2 teaching are also presented. In Section 7.4, I move to a discussion of the strengths and limitations of the present study and offer suggestions for future studies in connection with the role of semantic transparency in L2 collocational research in general and L2 collocational learning and teaching in particular. In Section 7.5, the chapter ends with a general conclusion, including a summary of the contributions made by the thesis.

7.2 General discussion

In Chapter Two, it was shown that, even though there is wide disagreement on the exact definition of collocation, many definitions involve the notion of semantic transparency in one way or another. Researchers from the two most prominent approaches to the study of collocations, i.e., the phraseological approach and the frequency-based approach, generally identify them in different ways based on various criteria including frequency as well as syntactic and semantic features. To reconcile these diverse views, some researchers have adopted a unified approach, aiming to marry the two traditions and build on their different individual strengths. This is the approach taken in this thesis. However, while some researchers view collocations as representing a distinct level of semantic transparency, either semi-transparent or fully transparent, others regard them as varying in their degree of semantic transparency. Consequently, a certain word combination could be categorized differently by different researchers, reflecting diversity both in the way semantic transparency is conceptualized and in the way it is measured. Even though it is it is widely acknowledged that semantic transparency is better described as a continuous concept, it has nevertheless mostly been classified into discrete levels in order to be more conveniently operationalized. In contrast, in this thesis, the semantic transparency of a collocation is regarded as occupying a place on a continuous scale between fully transparent and fully opaque. Semantic transparency, operationalized as a continuous variable, has usually been measured using human judgments or, more recently, by computational methods. As each approach has its own merits, the feasibility of both as measures of the semantic transparency of collocations was the subject of investigation in Chapter Five.

In Chapter Three, it was highlighted how collocational competence is highly significant for L2 learners as it enhances and facilitates processing and fluency in the L2. This chapter also critically reviewed some of the key factors that have been put forth to account for the

problems L2 learners face in learning collocations. These mainly relate to the relative frequency of collocations in the language, the degree of combinability of their constituent words, their L1-L2 congruency status and the level of their semantic transparency. However, the studies that investigated these factors inevitably have some limitations in their methodology. Some of the serious gaps that these studies suffered from include (i) not properly controlling for prior knowledge of both collocations and their constituent words; (ii) not using extensively validated and piloted data collection instruments; and (iii) not taking into account the effect of semantic transparency and/or estimating its degree with reliable methods. Among these investigated factors, examining the effect of semantic transparency on collocation learning is a topic that most collocation research has seemed to shy away from, even though its relative impact is broadly recognizable by most researchers. This is perhaps at least partly due to the complexity of measuring this factor in practical and reliable ways.

Chapter Four brought to light another under-researched area in the field, namely the effect of instruction and different pedagogical methods on collocation learning. Compared to research on teaching single words, collocation instruction has not received the attention it merits. Nevertheless, some initial findings point to the fruitfulness of implementing a number of teaching techniques which have also proved to be effective for teaching single words. Both implicit and explicit teaching were found to lead to good learning gains, with the latter being superior to the former. However, none of the available pedagogical studies have attempted to look into the effectiveness of teaching collocations when their varying degrees of semantic transparency are taken into account. In other words, prior to the present research, the extent to which the teachability of collocations is related to their degree of semantic transparency has not been taken into consideration.

In Chapter Five, it was clearly illustrated that verb-noun collocations, defined in this thesis as frequently occurring combinations in which the noun heads the complement of the

verb, do indeed exhibit some variability in their semantic transparency. This scale of transparency was established by human ratings which, although subjective, did converge across multiple raters; moreover, these ratings were confirmed by computational measures of semantic transparency based on a much larger English sample. The use of both human ratings and distributional-based semantic measures was intended to improve the rather unreliable methodology used by past studies in their estimation of the semantic transparency of collocations. It was also intended as a method of data triangulation leading to more reliable results.

The outcome of the analysis of the semantic transparency estimations based on these two methods brought about some noteworthy findings. This analysis mainly demonstrated a very strong correlation between these two different methods, suggesting that the use of either could lead to a similar estimation of the degree of semantic transparency. This is quite interesting as a computational measure, in this case the distribution-based semantic measure (in particular the distributional similarity between the verb and noun of a collocation), was able to simulate to a great extent the ranking of semantic transparency carried out by human raters. The results based on these two methods also indicated that the targeted collocations varied in their degree of semantic transparency while mostly being relatively more transparent on the scale of semantic transparency. This could be reflecting either a property exclusive to the selected collocations in this study or a general characteristic of collocations; only the carrying out of a larger scale estimation of the semantic transparency of a larger number of collocations would confirm this one way or the other. However, the fact that a reliable computational method has been established means that estimating the transparency levels of a larger sample could be done relatively easily. The results also illustrate that both component words of a verb + noun collocation contribute to the semantic transparency level of the collocation as a whole. This finding challenges a common claim in the literature (e.g.,

Boers et al., 2014; Peters, 2015) which maintains that the verb often contributes little to the semantics of the verb + noun collocation. The evidence here does not support such a claim, but more empirical research is needed to confirm these findings (i.e., that both component words contribute to the semantics of the whole collocation).

Chapter Six was devoted to addressing the central aim of this work, which was to find out the extent to which semantic transparency could influence the learning of new collocations by L2 students. The students' learning of collocations was measured after they had received an intensive, explicit instructional intervention which lasted for five consecutive weeks. Hence, an additional aim of this study has been to explore the effect of the teaching method employed during the instructional intervention in students' learning of collocations. A further goal of this chapter was to examine the potential of semantic transparency estimations based on both human ratings and distributional-based semantic measures to successfully predict (i.e., to correlate with) the learnability of collocations. The results of the endeavours to fulfil these three main objectives will be discussed in what follows.

The pedagogical intervention experiment reported in Chapter Six provided evidence that the degree of semantic transparency affects the learnability of L2 collocations, but with appropriate pedagogical techniques even the least semantically transparent collocations can be learned by the majority of learners. These findings confirmed our prediction that reduced semantic transparency negatively impacts collocation learning. In contrast, fully transparent collocations were easier and much more successfully learned by all learners. This outcome can be attributed to Wray's claim (2002) which maintains that L2 learners are often inclined to segment the words of multiword combinations and interpret them literally, even when they reflect a unified meaning that is beyond the added-up meanings of their separate parts, which is the case for the majority of less transparent collocations. This claim was tentatively empirically supported by researchers such as Gyllstad (2007), who concluded that L2 learners

store and look at lexical units as single words because his learners failed to correctly recognize some verb + noun collocations but were able to recognize their component words when they were presented individually. Blais and Gonnerman (2012) also provided empirical evidence indicating that, in contrast to native speakers, L2 learners resort to literal interpretations of more opaque expressions based on their performance in a semantic judgment task. Therefore, this study offers additional supporting evidence that less transparent collocations are harder for learners to learn than transparent ones, because arriving at the correct interpretation of their meaning requires knowledge of their holistic meaning, which some L2 learners apparently need more experience to perfect. The rigorous methodology of this study renders this outcome stronger and more convincing than that found in the previous four collocational studies that reached similar conclusions (Huang, 2001; Revier, 2014; Macis and Schmitt, 2017a; Gyllstad and Wolter, 2016), which are limited by their inadequate control of a number of potential confounding variables. A further significant finding of the present research is that most learners were able to correctly recognize and produce the majority of the targeted collocations, including those with a reduced level of semantic transparency. This suggests that, when collocations are taught with appropriate teaching methodology, this could lead to their positive learning—even for those less transparent collocations that are notorious for their difficulty.

One of the unique aspects of this study concerns the attempts that have been made to differentiate two factors: semantic transparency and L1-L2 congruency. In her examination of the collocation items that were used in past studies, Yamashita (2018) found initial evidence pointing to a confound between semantic transparency and congruency. She discovered that most collocation items which were reported as difficult to learn due to their incongruency to learners' L1 were those more likely to be categorized as less transparent and vice-versa. This leads to the question of whether semantic transparency would still have an impact if the

congruency effect were controlled for by testing only congruent collocations. This is to avoid the risk of confound between these two factors, which would make it difficult to tell if the problem in learning collocations is due to congruency or reduced transparency. Thus, it was important in this study to disentangle the effect of these two variables. With the way the present pedagogical experiment was set up, i.e., with careful control of all the other possible explanatory factors, it was interesting to find out that even when collocations were all congruent, the degree of semantic transparency appeared to have a significant impact on the learnability of collocations.

The difficulty in learning less transparent collocations was observed at both recognition and production levels, but appeared more prominently in the recognition skill. To explain this result, it is important to remember that the production test was administered the following day immediately after the end of the intervention, whereas the recognition test was administered a week later. It is also noteworthy that the analysis revealed evidence of collocation unlearning in the learners' scores from the later administered recognition test, and most of these unlearned collocations, i.e., those which were correctly produced but incorrectly recognized, were found to be less transparent in their meaning (collocation unlearning correlated significantly with a reduced level of semantic transparency). This led to the suggestion that semantic transparency is more obviously predictive of longer-term learning of collocations.

As mentioned above, learners were found to perform better on collocation production than on its recognition, but this was detected irrespective of the degree of semantic transparency of the test items. This finding contradicts an often-found result in the research (e.g., Koya, 2005; Jaén, 2007) which shows the productive knowledge of collocations as lagging behind their perception. One explanation for this can be linked to the administration time of the tests, in which context there is some evidence indicating that a later testing time

could lead to less sizable learning gains compared to immediate testing (e.g., Peters, 2014). Therefore, the decline in collocational knowledge in the recognition test might result from its later administration, compared to the production test. Another possible interpretation for the higher scores of the production test compared to the recognition test is related to the fact that test items in the production test were contextualized, which possibly made them easier to understand than the uncontextualized items in the recognition test. Furthermore, the production test employed a multiple-choice format which is different from the traditionally used format to test production (e.g., gap-filling or L2 translation) and probably not as demanding. Moreover, the generous marking scheme employed in the assessment of the test, which did not take into account the correct/incorrect use of the articles, might be one of the reasons for the extremely high scores of that particular test (see Chapter 6, Section 6.5.1, for more detail on this scoring system). The articles were not considered because the test was not intended to test the learners' grammatical knowledge (which would have been the case had their knowledge of the articles been taken into account in the scoring system) but rather their collocational knowledge, meaning that their accurate knowledge of the main component words that compose the collocation was considered sufficient to reflect this knowledge. The second reason for implementing this marking system was essentially to be consistent with previous uses of the same test (in particular Revier's (2014) use of the original version of this test) and for the results in the present study to be comparable with other published results.

Collocations were mainly taught explicitly during the pedagogical intervention, and care was taken to follow best practice in the literature for teaching collocations. The results clearly demonstrate that the adopted method of instruction was highly effective in the teaching of verb + noun collocations, which are known for their slow acquisition by L2 learners. This explicit mode of teaching led to large learning gains even for the less transparent collocations and in spite of the targeted learners having low levels of English proficiency. The results of

this study are encouraging and compatible with El-Dakhs et al.'s (2018) study (an earlier pedagogical intervention that investigated the learning of verb + noun collocations by Arab learners of English in the Saudi Arabian context), whose authors showed clear learning gains from the explicit mode of teaching in the form of offering L1 definitions and sentence-generating tasks. Hence, it can be argued that explicit instruction is an optimal mode for the teaching of collocations, especially for Arab learners in the Saudi Arabian context with limited English exposure. The findings in this study also offer additional support for and confirm earlier intervention studies which highlighted the positive effect of certain explicit teaching techniques in accelerating the learning of collocations (Liou and Chen, 2018; Sonbul and Schmitt, 2013; Webb and Kagimoto, 2009; Boers, Dang, and Strong, 2017b). Some of the effective explicit practices employed in the present study include integrating the four learning conditions proposed by Webb and Nation, 2017, namely *noticing*, *retrieval*, *varied encounters or use* and *elaboration*, during the presentation and practice phases of teaching the targeted collocations which were optimal for their successful learning. In addition, typographical enhancements through bold, red font highlighting, the provision of L1 meaning and the use of task formats that elicit the intact structure of collocations were also all useful in promoting the learning of collocations, confirming past pedagogical interventions which asserted the fruitfulness of such teaching techniques.

The conclusion drawn in the pedagogical intervention regarding the revealed role of semantic transparency in the learnability of collocations was based on the strong correlational relationship uncovered between collocation learning and both human transparency ratings and distributional measures (particularly the distributional similarity between the verb and the noun). The tight control of the main other potentially affecting factors (except semantic transparency) in this study leads to the deduction that both human transparency ratings and the distributional similarity measures between the verb and the noun can be considered strong

predictors of the learnability of collocations. These two measures were found to predict the overall learnability of collocations to a highly significant extent. The correlational value between overall collocation learnability and either human transparency ratings or distributional similarity measures (estimating the semantic similarity between the verb and noun of a collocation) was the same (r_s (42) = .93, p-value < 0.01). This suggests that both computational measures and human transparency judgments can be regarded as two equally reliable methods for the estimation of the relative semantic transparency of collocations and the prediction of their learnability. These findings have significant pedagogical implications, which will be discussed in the following section.

7.3 Research and pedagogical implications: recommendations for L2 collocation instruction

This study has significant implications for L2 collocation research in general and L2 collocation pedagogy in particular. An important implication concerns the understanding of the extent to which semantic transparency has an impact on L2 learners' development of collocational competence. Although the majority of past collocational research has acknowledged the potential influence of semantic transparency, its real effect has not been adequately empirically evidenced. As demonstrated in this study, semantic transparency is a key factor that plays a central role in L2 collocation acquisition. On the basis that more opaque collocations were more difficult to learn than more transparent ones, an important theoretical implication of this study is that semantic transparency should be considered an essential factor that deserves to be incorporated in any model of L2 collocational acquisition. A further implication for L2 research concerns the need to re-evaluate the view that L2 learners' collocational knowledge is always lacking and the development of this knowledge is difficult, especially for learners at low proficiency levels. The results of this study are a testimony to the fact that such a claim, viz, that learners do not seem to be able to achieve L2

collocational competence, is questionable. Although acquiring collocations might not be an easy task, it is attainable, even for learners with low proficiency. The students in this study were able to learn new collocations to a very significant extent, in spite of their limited language repertoire.

The present research has important pedagogical implications for L2 teaching and learning. As has been widely proposed (e.g., Lewis 1997), L2 teachers should direct learners' attention to the existence of collocations in language and to their essential contribution to language proficiency development. However, as pointed out by González Fernández and Schmitt (2015) "just asking learners to pay attention to collocations does not seem to be that effective, and focusing learners' attention on target items seems to require an explicit approach, such as using typographical marking, e.g., bold and underlined font" (p.97). In this study, such an explicit approach was effective in supporting the learning of collocations; it is assumed that the use of coloured and bold font enhanced the saliency, and hence learnability, of collocations. Explicit practice exercises using gap-filling and multiple-choice might have further supported learning. These teaching practices were shown to be helpful for the learning of collocations with varying levels of semantic transparency.

An important matter to consider is how English L2 teachers could deal with the challenging issue of establishing the relative semantic transparency of the collocations they wish to teach in an appropriate and practical way. Although pooling human transparency ratings is usually considered a relatively reliable method, it is not the most practical one for L2 teachers, as it is costly and time-consuming. The use of computational measures such as the distributional-based semantic measures could be a readily practical method of evaluating the semantic transparency of large numbers of collocations in a short space of time. Designing and making available a computational program that can automatically compute the semantic transparency levels of different collocations would be of great value to L2 teaching.

On this basis, lists of collocations ranked according to their semantic transparency could then be widely disseminated for the use of teachers and course designers to enrich the teaching of English L2 collocations. This would assist teachers as well as those designing teaching materials and exams in their decisions about which collocations, based on their semantic qualities, are expected to pose difficulties for L2 learners. This is especially relevant to non-native speaker teachers, who lack native speaker intuition about the semantic transparency of multiword expressions.

But what about the teaching of less semantically transparent collocations in particular? One of the main implications of the results of this study is that less transparent collocations merit substantial attention in L2 classrooms. This is especially important, as classroom time is often limited and the time needed to teach all types of collocations would not be available for most L2 teachers. In the case of transparent collocations, L2 students may be able to arrive at their meaning by combining the meanings of their component words, so teachers would only need to draw students' attention to their existence. However, as found in this study, recognition of less transparent collocations can be more challenging for L2 learners, and thus teachers would need to give more time and focus to such word strings. In agreement with this, Martinez (2013) argues that less transparent multiword expressions should be explicitly taught and given priority in the L2 classroom, since these types of expression are more likely to be misunderstood or even not accurately identified by a learner without help from a teacher or dictionary (Martinez, 2013, pp.188, 190).

There are several practices that teachers can adopt to help learners disambiguate the meaning of less transparent collocations and enhance their learning. For example, Jones and Haywood (2004) have suggested that "encountering or using an item in various contexts helps illustrate and refine its meaning" (p.272). In this research, the meaning of the collocations, including more opaque ones, was clarified with the help of contextual

information. Presenting the collocations in three different contexts comparable in language complexity (i.e., using words that were familiar and suitable to the students' language level) supported learning of their different meanings and use. For more advanced students, compared to the participants in this study, corpus concordances can be an effective tool that might be used by L2 teachers to enrich the learning of less transparent multiword expressions, as also proposed by Hsu (2014):

> English teachers can raise their students' consciousness of how opaque formulaic sequences behave in context with the help of free online concordancers (e.g., Compleat Lexical Tutor at http://www.lextutor.ca/concordancers; Virtual Language Center at http://vlc.polyu.edu.hk; GloWbe at http://corpus2.byu.edu/glowbe/). By using corpora, students can gain direct access to abundant examples of authentic language, resulting in a better understanding of the use and patterns of certain nontransparent phrases.
>
> (p.156)

Moreover, teachers who aim to foster the learning of more opaque collocations may wish to adopt activities, such as those employed here, that elicit the whole collocation, as this emphasizes the overall meaning of the collocation at phrasal level and promotes its successful acquisition. As mentioned above, L2 learners' tendency to decompose the meaning of multiword expressions including collocations could be a factor that impedes the acquisition of semantically opaque collocations. Therefore, as emphasized by Boers et al. (2014) "collocation learning […] must be encouraged by presenting words which are likely still to be novel to the learners not as single items but, right from the start, as constituents of multiword units" (p.46). This way, the emphasis is on learning the meaning of collocations as a whole and not just as a sum of their constituent words.

7.4 Limitations and directions for future research

The findings of this study need to be interpreted in the light of a number of inevitable limitations that future researchers are invited to address. Word length (number of characters) was a variable that was not controlled for in this study. The evidence with respect to the potential impact of word length on collocation learnability is mixed. Peters (2015) found that greater word length increased the learning burden of L2 collocations. On the other hand, word length did not have any significant effect on the processing of collocations in the findings of Gyllstad and Wolter (2016). In fact, Hsu (2014) argues that longer word length can positively impact the learning of multiword expressions, claiming that "the length of multi-word units has some influence on semantic transparency. When formulaic sequences become longer, their potential for ambiguity and polysemy will decrease" (p.153). However, it is only when more convincing empirical evidence is available that a conclusion could be more confidently drawn regarding the possible influence of this factor.

A second limitation of the present study concerns not taking into account the influence of individual differences between L2 learners, such as motivation and gender difference. All the participants in the study were female, because the instructional intervention was conducted in a public school in Saudi Arabia, where most public schools are segregated by gender. Future studies might take into consideration the possibility of gender influence on learning collocations with varying degrees of semantic transparency. Moreover, as all the participants in this study were highly motivated (the main reason for their participation was they were very interested in developing their English language skills, which they had already selected as the topic of their extracurricular activity) and from Saudi Arabia with Arabic L1, another direction for future studies may be to examine the impact of these two variables (motivation and L1) on learning collocations with varying degrees of semantic transparency.

Contrary to most available evidence, learners' collocation production was found to be slightly better than their recognition. Some of the plausible accounts that have been put forth for this disparity are related to the difference in time of testing and test format (see Chapter 6, Sections 6.7 and 7.2, for more detailed interpretation of this finding). Studies that address these issues—by, for example, using a hybrid test at both time points or reversing the order of the tests with some participants—would enrich our understanding of the effect of semantic transparency on collocation learnability. In addition, this study has focused on congruent collocations (i.e., collocations with translational equivalence in learners' L1) and on a specific type of collocation, namely verb + noun. A further avenue for future research would be to examine the intercorrelation between the effect of semantic transparency on incongruent collocations or on a different class of collocations such as adjective + noun.

During both individual word and collocation teaching phases, all students saw the collocations in the same order, i.e., following the same teaching/recycling schedule, so the order of collocation presentation could have potentially been a confound. This proved not to be the case in the present study, however, as the presentation order in either phase of teaching did not significantly correlate with any of the human semantic transparency ratings, production scores, recognition scores or overall learnability. Nevertheless, future studies are advised to teach the collocations to each class in a different random order to guard against possible effects of teaching order.

7.5 Conclusion

This study set out to explore the effect of semantic transparency on L2 students' collocation learning after five weeks of collocation-focused instruction. The extent to which the collocations were learnt was measured in two written post-tests, one targeting collocation recognition and the other collocation production, in order to arrive at a more comprehensive

picture of L2 students' learning gains of collocations with varying degrees of their semantic transparency.

Semantic transparency was found to significantly impact L2 collocation learnability. The lower the relative semantic transparency of a collocation, the less successfully it was learned. This effect was prominent in both the recognition and production dimensions of collocational learnability. However, caution should be taken when interpreting the results of the production test of this study, because it is questionable whether the production test was actually testing production in a true sense. The findings also revealed a large learning gain as a result of the instructional intervention. This suggests that the teaching method adopted, i.e., explicit instruction, and the types of activities used, are effective in promoting L2 collocation learning. Finally, the study showed that a computational measure of semantic transparency, namely the cosine similarity of the verb and noun, is highly correlated both with human ratings of semantic transparency and collocation learnability. The study has therefore made the following contributions to the field of L2 collocations:

1. The study is original in its attempt to tightly control for prior knowledge of collocations, both as constituent words and as whole structures, which has not been achieved in previous studies.
2. The results show a statistically significant effect of semantic transparency on L2 collocation learning with tight control for previous knowledge and congruency.
3. The significant learning gain after intervention demonstrates that collocations can be explicitly taught, even to low-level L2 students.
4. The computational model shows that distributional semantic measures can be used to estimate transparency, specifically the cosine similarity of the constituent words. This is a much less costly and labor-intensive method than obtaining human ratings, which

therefore has the potential to be scaled up for application in materials writing and curriculum design more generally.

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Appendices

Appendix A: Sample of congruency judgment task

English-Arabic congruency judgment task

In the task below, you are kindly requested to **translate** each one of the 44 collocations from English into Arabic, and then **decide** whether each English collocation is ***congruent*** or ***incongruent*** based on the following definition of congruency:
An English collocation is considered to be congruent in English and Arabic if it has a word-for-word translation equivalent in Arabic. In contrast, an incongruent collocation is English specific and does not have a direct translation in Arabic.
Example of a congruent collocation: *white lie*
The English collocation ***white lie*** has a word-for-word translation in Arabic كذبة بيضاءand is therefore considered congruent in both languages.
Example of an incongruent collocation: *heavy smoker*
The English collocation ***heavy smoker*** might be translated into Arabic as مدخن شره(**excessive smoker*) but not as * مدخن ثقيل. In other words, it does not have a direct translation equivalent and is therefore incongruent.

The following are examples showing how this task can be completed:

No.	**Collocation item in English**	**Translation in Arabic**	**Congruency status**
1	Play a role	يلعب دور	congruent
2	Soft drinks	مشروبات غازية	incongruent
3	Give birth	يلد	incongruent
4	Tell the truth	يقول الحقيقة	congruent

Name: …….
Job title: ……

No.	Collocation item in English	Translation in Arabic	Congruency status
1	restore trust		
2	implement a treaty		
3	deserve an award		
4	monitor pollution		
5	assign priority		
6	arrest the decline		
7	vary the height		
8	translate a phrase		
9	cast a reflection		
10	contact the manufacturer		
11	enable the viewer		
12	distribute electricity		
13	balance a load		
14	accompany an exhibition		
15	enhance someone's reputation		
16	shape the curriculum		
17	exercise the imagination		
18	rule the universe		
19	detect an error		
20	dismiss a suggestion		
21	permit entry		
22	plant a flag		
23	inform selection		
No	**Collocation item in English**	**Translation in Arabic**	**Congruency status**
24	yield an insight		

25	assist recovery		
26	race the clock		
27	possess (a) talent		
28	accomplish an objective		
29	overcome a barrier		
30	impose a penalty		
31	assess a personality		
32	approve a recommendation		
33	switch channel		
34	occupy territory		
35	embrace diversity		
36	bury waste		
37	doubt the existence		
38	adapt a recipe		
39	process a request		
40	negotiate an arrangement		
41	practice a craft		
42	display emotion		
43	celebrate a wedding		
44	resist infection		

Appendix B: Sample of the whole semantic rating questionnaire

How transparent in meaning ...?

In the contexts below, the task is to decide **either** to what extent a *given word* within a phrase is semantically transparent, **or else** to what extent the *whole phrase* is semantically transparent.

Semantic transparency refers to the extent to which the meaning of the component words of a phrase contribute to the meaning of the whole phrase, and the extent to which the meaning of a phrase could be predicted or understood from the meanings of its two component words.

Enter a number between 0 and 5.

* 0 means: fully opaque /non-transparent, the meaning of the word or phrase is difficult to figure out or to be understood literally.
* 5 means: fully transparent, the meaning of the word or phrase is easily or fully understood very literally.
* Use values in between to grade your decision.

Note: In the examples below, scores don't imply a right answer. The task is subjective and there is not a single correct answer. Instead we are asking for your opinion.

Example 1:
I have decided to **take a course** in History this semester.
How transparent in meaning is the use of "take" in the phrase "take a course"?

- YOUR ANSWER: might be 1
- Reason: "take" here does not refer to physical action of taking but means to enroll in a course and so the meaning of "take" contributes very little to the meaning of the phrase "take a course".

Example 2:
I **took money** from my mom's purse and she thought it was my brother.
How transparent in meaning is the use of "take" in the phrase "take money"?

- YOUR ANSWER: might be 5
- Reason: "take" means literally moving something from one place to another which is the meaning denoted in the phrase "take money".

Example 3:
He asked the doctor to **take a look** at his cut.
How transparent in meaning is the *phrase* "take a look"?

- YOUR ANSWER: might be 3
- Reason: the meaning of the whole phrase is derived from only one of its words "look" and no sense of "take" is found in meaning of this phrase. So, this phrase would be rated midway between transparent and non-transparent.

Example 4:
They were arguing, but I did not want to **take sides**, so I left.
How transparent in meaning is the *phrase* "take sides"?

- YOUR ANSWER: might be 2
- Reason: the phrase here means "to choose one side of an argument". There is no sense of the word "take" in the phrase. Yet, the phrase would not be considered fully opaque because there is some meaning of "side of argument" from the word "sides".

How transparent in meaning ...?

accomplish an objective:

Definition:

to gain with effort an intended goal

Examples:

1. To accomplish the objective of conserving and using raw medicinal materials sustainably, however, the method facilitating access should have the following three conditions…
2. Racism and discrimination will go away when African-Americans take responsibility for their own fate rather than staging protests and marches against practical solutions chosen by white people to successfully accomplish an objective, completely devoid of racial overtones or motivations.
3. I like to think that some of my classroom activities provided the Chinese with a better understanding of why Americans are the way they are. The lectures I prepared for the Guest Lectures Program were specifically designed to do this, and I think I have accomplished the objective very well.
4. It is clear that a successful investor must set an objective in terms of what is to be achieved, and what is the anticipated time frame in which to accomplish the objective.
5. I've learned a lot about marketing artwork in these five years -- sometimes by making mistakes -- and I've accomplished my objective of becoming a full-time professional artist.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **"accomplish an objective"**

Fully opaque — Fully transparent

1 | 2 | 3 | 4 | 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

balance a load:

Definition:

bring into equilibrium a weight to be borne or conveyed

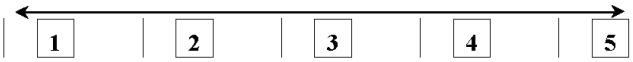
Examples:

1. … Her mother's bound feet are her " most vivid childhood memory, " leading the reader to wonder how 85-pound Guo Yuxian, even now so strong " she can balance a load heavier than she is, " has turned to the more difficult task of creating new options for her own daughter, Wu Wenbo …
2. … The Magnum is your basic rigid-construction, steel game cart, …. The puncture-proof tires come in handy in cactus country, although inflatable bicycle tires perform better over snow and mud. If you balance the load correctly, there will be zero weight on the handle and the cart will pull like a feather.
3. … It was my trailer, the two-wheel flatbed loaded with dead calves, cruising serenely past me. I watched it in fascination. I had obviously not fastened the hitch properly, but by God I had balanced the load well.
4. … She wore a torn red sari of the cheapest cloth, toe rings on her brown feet, and carried a load of sticks on her head. One arm was raised to balance the load, the other swung beside her ...
5. Maytag's new Atlantis washer ($800), for example, …Microprocessors are also used to balance the load and to save water by automatically adjusting the water level to the load size.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"load"** in the phrase **" balance a load"**

Fully opaque — Fully transparent



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

resist infection

Definition:

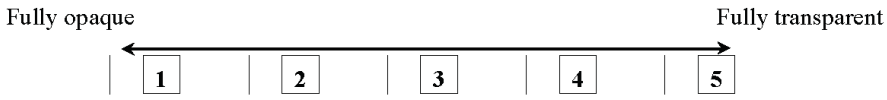
withstand the invasion of the body by pathogenic microorganisms

Examples:

1. Rosemary is known for its ability to resist infection but recent studies also indicate that it may be beneficial in preventing breast cancer and improving digestive health.
2. Immunity specialists say that unless you're immunosuppressed because of illness, the body's natural defenses and frequent hand washing are all you need to resist infection from everyday viruses and bacteria.
3. Ask your doctor about keeping you warm during surgery. Operating rooms are often cold, but for many types of surgery, patients who are kept warm resist infection better.
4. One main glucoside is rutin, which is important for its ability to help capillary walls resist infection, improve heart function and respiration, promote better healing and coagulation and control hypertension by regulating blood flow.
5. The experiment aims to arm a patient's white blood cells with genes that will make them resist infection by HIV, the AIDS virus, or prevent HIV from infecting other cells.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **"resist infection"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

cast a reflection:

Definition:

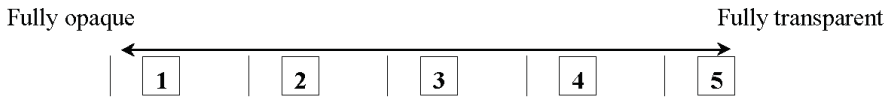
throw the image of something back from a surface

Examples:

1. … Of all the statistics and studies that are hoisted upon the American public to cast a reflection of how it lives, the most troubling slat is 15%, contends Fred Sellers, pastor of the Victory Church of Norman, OkIa., and author of 777e Prophet of Vail Mountain …
2. … Today, the 470-foot monolith of Big Dune, the largest single sand dune in North America, casts a reflection upon Sand Dunes Lake.
3. … People had been skeptical at first, but when they discovered it was true, the fact that he apparently made his photographs disappear only added to his mystique. # He couldn't explain his inability to be photographed any more than he could explain why he cast no reflection in a mirror.…
4. … To be sure, the Kremlin, Red Square, and St. Basil's Cathedral are ornaments of empire, even if, in their midst, the polished marble of Lenin's tomb casts a reflection of death.
5. General Electric's leader, Jack Welch, created a three-way battleto produce a successor. When the winner emerged, the other two candidates left. One was Bob Nardelli, who took the top job at Atlanta-based Home Depot. # The battle Nardelli experienced at GE could cast a reflection on Coke. On Wednesday, Nardelli is expected to be elected to Coca-Cola's board of directors

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"cast"** in the phrase" **cast a reflection"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

practice a craft

Definition:

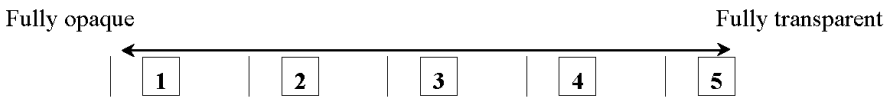
carry out a skill in an occupation or trade

Examples:

1. I suggest that somewhere in their history, the " mothers " of these potters became the wives of griots who practiced the craft of leatherworking in the absence of demands for their skills as oral artists
2. Many ad agency people entered the business because they were inspired by three legends who dominated Madison Avenue in the 1960s. These men weren't just managers; they actually practiced the craft of making ads.
3. … Bronko is used to sweating in kitchens far hotter than this studio. Besides, he belongs here just as much as he belongs over the open flame of a commercial stove, plying the trade and practicing the craft he loves more than he's ever loved anything.
4. … Our friend Tim Russert is not in the studio across town, practicing the craft he honed over 17 years of Sundays. His chair is empty …
5. The women, all experienced tapa makers who had not practiced the craft in years, thoroughly enjoyed the experience, taking " really lovely " pride in their finished product, ...

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **"practice a craft"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

dismiss a suggestion:

Definition:

bar an idea from consideration

Examples:

1. Another former council member, Mowaffak al Rubaie, was asked after the ceremony whether the Cabinet was too similar to the Governing Council to gain real legitimacy. He dismissed the suggestion as rubbish.
2. He dismisses the suggestion of segregation and points out that in less- populated parts of the country, Anglican schools boast a wider mix of pupils drawn from all parts of the community.
3. … There is no indication that Wilson's view changed during his presidency as he kept Marshall at arms length and dismissed the suggestion that he should try to make something of the office.
4. He declined to specify which office he might still be thinking about seeking. He dismissed the suggestion that there was any connection between his donations and his lobbying work.
5. … Michael Goldstein, chief executive of Toys " R " Us, dismisses the suggestion that toy stores like Noodle Kidoodle, Learningsmith and Zany Brainy pose a threat to his business.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"suggestion"** in the phrase **" dismiss a suggestion"**

Fully opaque — Fully transparent

1 2 3 4 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

celebrate a wedding

Definition:

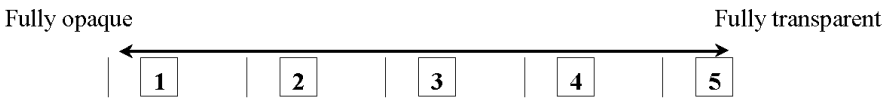
behave as expected during the social event at which the ceremony of marriage is performed

Examples:

1. … Over time, quilts assumed other roles: to celebrate a wedding or birth, complete a hope chest, or commemorate a historic event.
2. …The tents along the Hyannis Port beach was in place today for the 275 guests here to celebrate the wedding of Bobby and Ethel Kennedy's young's child, Rory.
3. The others of the tonnara crew were all ashore, helping to celebrate the wedding of the fleet owner's daughter, and only the four of them had been left behind to clean up the boats and to protect the nets from vandals or thieves.
4. It had given her special joy to see the home she and Luke shared filled with guests - some of whom had come all the way from Lancaster County, Pennsylvania, to celebrate the wedding of her daughter Millie to Luke's younger brother Ira.
5. Some of these Afghans say they were firing weapons in the air to celebrate a wedding when the air attacks began, and they claim more than 100 innocent celebrants were killed.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **" celebrate"** in the phrase **"celebrate a wedding"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

enhance someone's reputation:

Definition:

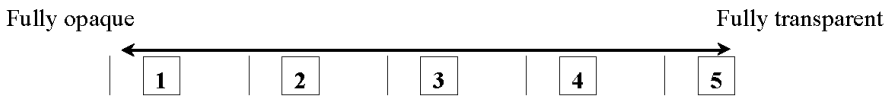
increase the general estimation that the public has for a person or an institution

Examples:

1. Mori Building is on the verge of offering its tenants long-distance service using … # Hiroo Mori, a director of Mori Building, figures the cost of a long-distance call will drop by as much as 75 percent. " We think this will enhance our reputation and make us more appealing to tenants, " he said.
2. … Judges generally score skaters from their own club more favorably because they know the skater so well and because a high-ranking skater enhances the reputation of the club.
3. … Rushdie is ironic about the degree to which the death sentence has enhanced his reputation. " It's a form of celebrity with all the downside and none of the upside, " he tells the college students.
4. … From a neo-institutional perspective, community colleges are motivated to launch baccalaureate degree programs to enhance their reputation and increase prestige.
5. … But because this was Philadelphia, the incident warranted more stories in newspapers and more minutes on television. It was as if the Irvin injury added a notch in Philly's gun and enhanced its reputation of having the nastiest fans in the country.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"enhance"** in the phrase **" enhance someone's reputation"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

accompany an exhibition:

Definition:

be associated with an event in which a collection of things are publicly displayed

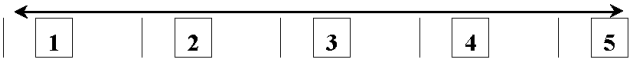
Examples:

1. A catalogue by LaGamma, published by the Metropolitan Museum of Art and distributed by Yale University Press (128 pp., 12 b/w &; 77 color photos; $30 softcover), accompanies the exhibition.
2. The brief video profile presented to accompany the exhibition, which includes glimpses of the house, is posted on the museum's Web site at …
3. … They can examine the Blast portfolio-publication, a series of bright-colored ovoid sculptures containing dozens of artists' multiples, which accompanies the exhibition …
4. This text developed out of an essay written as part of the publication Seven Books to accompany my exhibition at the Muse d'Art Moderne de la Ville de Paris, May 7-June 22, 2003.
5. … Working closely with Austin, the Art Institute's Department of Museum Education developed extensive programming to accompany the exhibition, including lectures and performances, and demonstrations by visiting artist Lamidi Fakeye…

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **" accompany an exhibition"**

Fully opaque — Fully transparent



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

occupy territory

Definition:

take a region by military force

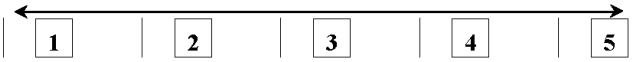
Examples:

1. … The fact that Israel was occupying the territory of Palestinian Arabs does not appear to have been a significant factor for U.S. decision makers.
2. The Confederates occupied territory just south of Washington, and the populace, the press and the politicians, including Lincoln, were demanding quick and decisive action by the Union army under the command of Brig. Gen. Irvin McDowell.
3. … Throughout the late eighteenth and into the early twentieth century, these populations jointly occupied a territory in southeastern Idaho, extending into the southern portion of the northwestern Great Plains.
4. Even though Marines occupied territory around the airfield, they were still receiving mortar attacks from surrounding hamlets. In an attempt to lessen this threat, one Marine battalion decided to experiment by mixing U.S. Marines with local Vietnamese forces and positioning them in the surrounding hamlets.
5. The objective is to destroy Iraq's offensive forces, not to occupy territory. An all-Arab or UN force would pass through U.S. lines and replace U.S. and other non-Arab units in place...

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **"occupy territory"**

Fully opaque — Fully transparent



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

contact the manufacturer:

Definition:

establish communication with the producer of something

Examples:

1. LIDS WITH MISSING KNOBS # KEEP If the pan or pot is still in working order, contact the manufacturer for the replacement part. If the knob has merely become detached, take it and the lid to the hardware store to buy a replacement screw.
2. After finding a selection of rugs and pillows she admired in a catalog, Brumfield called the mail-order company to find out who made them. She then contacted the manufacturer and sent samples and photographs, and within a few months a contract was signed.
3. " Penha contacted a manufacturer of Dead Sea products in Israel and asked them to provide her with products. Using $30,000 of her own savings, she built up inventory and rented a kiosk at a mall.
4. If the person who sold you the defective product or service won't help, contact the manufacturer or corporate headquarters of the service provider…
5. If you work with grades k-12 as a teacher or staff member, you might also be eligible for the discount; contact the manufacturer or an educational dealer to find out.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **" manufacturer"** in the phrase **" contact manufacturer"**

Fully opaque — Fully transparent

1 2 3 4 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

bury waste

Definition:

place unwanted materials in the earth and cover with soil

Examples:

1. " Sonia thinks Hanford is burying waste illegally, but she's a conspiracy nut. Me, I think it's a bug in our post -- processing code.
2. Energy Secretary Spencer Abraham formally announced a plan yesterday to bury the waste at Yucca Mountain in Nevada. Nuclear industry officials have welcomed the announcement; officials in Nevada are vowing to fight it…
3. To some recreationists, however, the idea of going to the trouble of burying waste is " kooky, " says NOLS outreach manager Rich Brame …
4. The waste deemed unsafe for human contact is so radioactive that it must be handled by machines in special shielded rooms called hot cells. It should come as no surprise, then, that the DOE would like to bury the waste a half-mile underground.
5. The concept of nuclear guardianship, advocated most forcefully by Joanna Macy, begins with the premise that current technological expertise does not offer a certifiably safe method for the disposal of nuclear waste: plans to bury the waste underground overlook known risks; …

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **"bury waste"**

Fully opaque — Fully transparent

1 | 2 | 3 | 4 | 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

display emotion

Definition:

show any strong feeling

Examples:

1. … Madhavi erupted in tears and fled when a family with a small boy entered; never one to display emotion in public much less break down like that, she hurried out without touching her mug of perfectly sweetened cappuccino…
2. All those surging backs and stretching limbs, those contorted poses, that strident heroic display of feeling in the human body - and really, the only muscles you need to display emotion are your lips.
3. For a moment, he stepped out of type. For a moment, he displayed emotion that he usually masks so well.
4. … " We've had a lot of fun playing together. " Opponents such as the Kansas City Royals' Roberto Hernandez enjoy playing against Williams because he doesn't show off or display emotion on the field.
5. … Each model emphasizes empathy and seeing the situation from the patient's perspective, and each uses the skill of briefly being silent when the patient displays emotion.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **" display"** in the phrase **"display emotion"**

Fully opaque — Fully transparent

1 2 3 4 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

process a request

Definition:

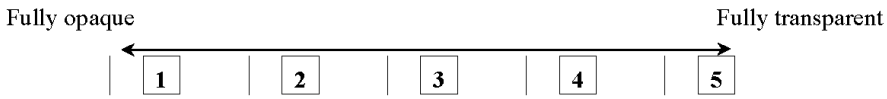
deal with a formal message asking for something

Examples:

1. In this NRDC suit, the government didn't refuse to turn over the information. They just asked for more time to process the request which they said was, you know, 7,500 pages, 2,100 documents
2. In the past, the State Department gave the C.I.A. and the F.B.I. 30 days to raise objections to a visa applicant, then processed the request as though the applicant had been cleared.
3. Every city, village, township, county and state department is required to name a FOIA, coordinator, who should help you identify the records you seek and process the request.
4. In order to process a request for data from the cache, the following steps must be completed: Generate the virtual address; …
5. Even though the agency is trying its hardest to process the request as soon as practicable, it could take a long time because of the scope, volume or complexity of what is being sought.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **" request "**in the phrase **"process a request"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

deserve an award:

Definition:

be worthy of a tangible symbol signifying approval or distinction

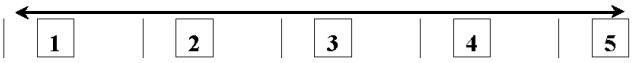
Examples:

1. The reigning two-time MVP deserves the award again for his selfless play and willingness to audible out of a pass if a run looks better…
2. …Hefley himself deserves an award for' hypocrite of the year' because, after his criticism of the NSF, he announced that the House was proposing $ 115.4 billion for two projects at Peterson Air Force Base in his district.
3. … And with us here in the studio is Linda Andrews. She's a teacher, has been for 22 years. She grew up with eight brothers, and she has two sons of her own. You deserve an award just for that, not even being here…
4. " The problem is not that there aren't people who deserve an award, but that people don't want to be nominated, " explains AFSA president J. Anthony Holmes to Nicholas Kralev of The Washington Times.
5. He was supposed to thank everyone. Instead, he realized two things: first, his company did not deserve the award, and second, no one else did, either…

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"deserve"** in the phrase **" deserve an award"**

Fully opaque — Fully transparent



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

shape the curriculum:

Definition:

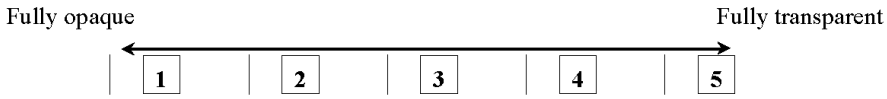
give form to an integrated course of academic studies

Examples:

1. As a result of narrowing our focus, we have had to drop some courses, such as American Culture and Conversation. On the positive side, however. we have been able to much more effectively shape our curriculum and better integrate courses and materials.
2. … " Locke recommended that teachers observe their students to learn their dispositions. By doing so, the curriculum can be personalized to meet each student's needs. # Disposition #3 The learner's perceptions should shape the curriculum.
3. … the show is the first to examine the far-reaching influence of Dow's art and teaching, which, at one time in Chicago, shaped the curriculum of the School of the Art Institute.
4. … Finally, teachers must begin to understand that they have power to shape curriculum and that their curricular decisions shape the way students see the word ...
5. During meetings children share strengths that are not always recognized elsewhere in the classroom. Children experience the power to shape curriculum and classroom life.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"shape"** in the phrase **" shape the curriculum"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

switch channel

Definition:

make a shift in television station

Examples:

1. The black box can determine which joke in a comedian's monologue prompted certain viewers to switch the channel or which medical emergency inspired viewers to exit Elk …
2. … the " Father Dowling Mysteries, " and others. Nuns are in IBM commercials, they're testing pudding. You switch the channel and there they are, sort of lending a symbolic presence to the hawking of a product.
3. She turned back to the TV and tried to pick up where she had left off. # Try our new fragrant ambrosia flavor. To drown # She switched the channel. # Would you kindly spin the wheel? # She switched again…
4. Last month, excerpts from a Vogue profile of Aniston exploded across the Internet, and, with a single quote on the cover-- " What Angelina did was very uncool " --a nation that had been fixated on presidential politics suddenly switched the channel back to the soap opera involving the actress, her ex-husband Brad Pitt, and his girlfriend Angelina Jolie.
5. My brother keeps on fiddling with the channel on the TV. One of those gadgets that switch the channel from far away.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"channel"** in the phrase **"switch channel"**

Fully opaque — Fully transparent

1 2 3 4 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

translate a phrase:

Definition:

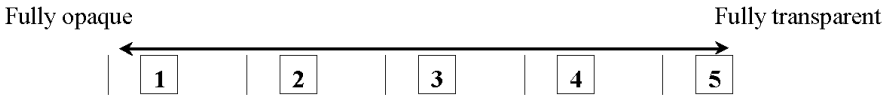
render an expression consisting of one or more words from one language into another language

Examples:

1. … " Now, neither of these criticisms provides Professor Nussbaum with any defense against Finnis's charge that she deceived the court in suggesting that Price's book rejects, as " tendentious, " the standard translation of " para phusin " as " unnatural " and instead translates the phrase in some fashion that avoids negative moral connotations ...
2. As he began speaking, even his voice -- deep yet lilting -- belied any hint of frailty. # # " Haah Ama, " he began in Asari, then translated the phrase into English, Luandia's colonial tongue: " Community, I greet you. " ....
3. He had heard the story about the multimillion-dollar computer that had translated the phrase " The spirit is willing, but the flesh is weak " into Russian as " The vodka is okay, but the meat is rotten.
4. But it is a particular kind of teaching, the kind referred to here as " sound teaching. " Frances Young translates the phrase as " healthy teaching " or " healthy words.
5. … But with real photos there's a stronger expectation of what we want it to look like, and that's why it becomes an interesting challenge. " # The added neural network layer pays close attention to what Bala calls " local affine patches. " There's no quick way to accurately translate this phrase, but it basically means the various edges within the image, …

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"translate"** in the phrase **" translate a phrase"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

negotiate an arrangement

Definition:

discuss the terms of an agreement

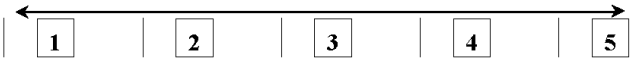
Examples:

1. Scott went out with Landis's physician, Brent Kay, and manager, Will Geoghegan, to pedal the foothills of Landis's training ground. By the time they rolled back into the driveway they had negotiated an arrangement: Scott would quit his job the following week and become a paid technical advisor and an expert witness …
2. To address the problem of the street pay phones, they tried to convince their owner to cancel his contract with the telephone company. The owner agreed to do so, but the telephone company refused to cancel his contract. Eventually, some members of the community policing group met with the company and negotiated an arrangement that the phones would no longer receive incoming calls.
3. Would it be possible to negotiate an arrangement with Mexico to build a huge camp in the middle of Baja California to take these prisoners? The mild climate would allow Army tents, fish from the gulf would provide a good diet, the Mexicans could get their roads improved and the security problem would be minimal.
4. Baseball is trying to cut a deal with Schott to provide a diplomatic end to an ugly episode. NL president Bill White is trying to negotiate an arrangement with Schott, and a public apology was considered necessary for any agreement.
5. It appeared as if policies in the two biggest economies in the world, the United States and the United Kingdom, were aimed at getting themselves moving at the expense of the economies in Europe. As the meeting began, European leaders were desperately trying to negotiate an arrangement to keep currencies stable.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **"negotiate an arrangement"**

Fully opaque — Fully transparent



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

How transparent in meaning ...?

exercise the imagination:

Definitions:

practice the formation of mental images of things or events

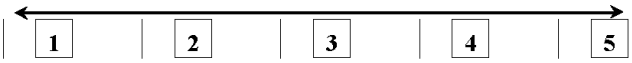
Examples:

1. To put themselves in the position of those potentially affected by their actions, agents need to exercise their imagination.
2. " Whether the existence of the world is a mysterium tremendum et fascinans or a mere tautology, it continues to exercise the imagination of philosophers and theologians, not to mention stoned undergraduates and insomniac yuppies having a Dark Night of the Soul.
3. At first glance this argument appears to be nothing more than another criticism of the Scholastic doctrine of " intentional forms, " since Descartes points out that if you accept his analogy of vision and the blind man's walking stick, " your mind will be delivered from all those little images flitting through the air, called' intentional forms,' which so exercise the imagination of the philosophers "…
4. My third garden is a 9-by-11-foot raised bed in a local community garden, …, this garden is my version of lovely. I go there to hear the birds sing, escape the street, and exercise my imagination.
5. Successful MMCP teachers knew that creativity cannot be inflicted on students… It would also thwart efforts to exercise the imagination and to develop a healthy relationship with music. The creative classroom functions optimally when the teacher, as well as each student, is involved in creative discovery, forming a community of musical inquirers.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 2: Score of 0-5 for how transparent in meaning is the use of **"imagination"** in the phrase **" exercise the imagination"**

Fully opaque — Fully transparent



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

enable the viewer:

Definition:

render the watcher capable for some task

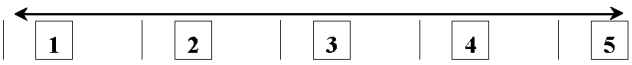
Examples:

1. If the student recorded eating out at a fast-food restaurant but was unsure of the total calories of the food, the software enabled the viewer to see almost every major fast-food chains' menus and the nutritional information with it.
2. Instead of a button that explicitly enabled the viewer to skip commercials, for instance, Barton designed a technically inelegant but diplomatically ingenious fast-forward button with three speeds, which might be called fast forward, faster forward, and faster-faster forward.
3. What we learn from Castagnary is that Pissarro's pictures enable the viewer to understand them as complete, wholly present, and, at the same time, to remain aware of their partialness.
4. The addition of one more view, such as a side view, to the top view enables the viewer to identify some additional characteristics of the building; but not until the viewer sees all three views (top, side, and front) can he or she understand the actual three-dimensional building
5. His first public work in New York was a steel circle sunk into an anonymous street in the Bronx … As Serra describes it: " After looking for a site in the Bronx for three or four months, I found a dead-end street that had stairways going up to an adjacent street, which would enable a viewer to look down on the piece from various levels ...

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the the phrase **" enable the viewer"**

Fully opaque — Fully transparent



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

distribute electricity:

Definition:

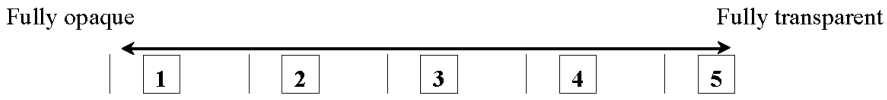
spread throughout a given area the energy that is made available by the flow of charge through a conductor

Examples:

1. … What failed was the grid, the enormous system of power lines and controls that distributes electricity from generating plant to your air conditioners, lights and radios.
2. The rules govern companies that generate, transmit or distribute electricity, and are highly technical in nature...
3. … In an instant that one utility official called " a blink-of-the-eye second " shortly after 4 p.m., the grid that distributes electricity to the eastern United States became overloaded ...
4. For most of us, 2050 might be considered light-years away but, for electric utilities - which implement public policy by investing in infrastructure needed to generate and distribute electricity to millions of people - it is just around the corner.
5. Members of the House Consumer Affairs Committee are considering testimony on the effects of the closures on the region's electric grid. Valley Forge-based PJM Interconnection, which distributes electricity to Pennsylvania and 12 other states, said last month it saw " no system reliability problems " stemming from the planned Oct. 9 deactivation of the plants.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **" distribute electricity"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

permit entry:

Definition:

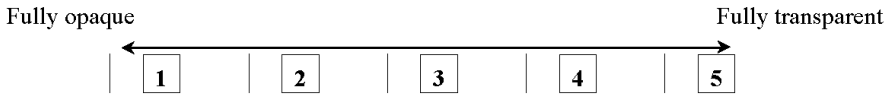
allow access to get in

Examples:

1. … Yet, troops have also secured acquiescence for entry into sacred sites during hot pursuits after insurgents, most famously when the governor of Najaf permitted the entry of U.S. troops into the hallowed Wadi al-Salam cemetery to clear it of insurgents.
2. Despite being male and a Drama noncustomer, I was permitted entry into a Drama House in Seoul.
3. As early as 1948 Congress passed the Displaced Persons Act, which eventually permitted the entry of 415,744 people, mostly Eastern European refugees then living in Germany and Austria who were unwilling to return to their homelands under Communist rule.
4. … she sees the top rung of a ladder just visible above the bottom ledge of a window adjacent to the shower. A small section of glass has been removed, just large enough to permit the entry of hand to the window lock.
5. … the state of mind that this officer had at the time he was seeking to obtain the warrant has no bearing on the determination of whether or not exigent circumstances apply to permit the entry without a warrant at the time that it was made.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"permit"** in the phrase **" permit entry"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

possess a talent:

Definition:

have a natural ability

Examples:

1. … To possess talent is one thing, to develop talent is another. Often parents and teachers do things to talented children rather than with them, and a form of child abuse is wrought.
2. … " Forsberg is by far the best all-around player right now. He shows no fear, he's willing to sacrifice his body and he possesses a talent people dream about.
3. Even though I didn't have a clue what I was doing, I presented " From Conception to Publication in Two Years " to groups interested in writing. Wannabe writers learned about the practical techniques I used to find a publisher -- and I discovered I possessed a talent for public speaking.
4. … " Although Clinton aspired to be president, he also possessed the talent and desire to become a professional musician.
5. Students who possess talent and drive seem to have become extraneous to the purported goals of public education-to educate all children, to foster equity, and to satisfy minimum competencies.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"talent"** in the phrase **"possess a talent"**

Fully opaque — Fully transparent

1 | 2 | 3 | 4 | 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

approve a recommendation:

Definition:

sanction an advised course of action

Examples:

1. … We were -- before this plan, we were facing a $50 million shortfall. And, as a result of the recommendation that I made, and as a result of the board approving the recommendation of closing these schools and reducing the amount of employees that we have, we will now break even.
2. In February, for instance, the ABA's policy-making House of Delegates approved a recommendation by the Task Force on Class Action Legislation that " some concerns over class action practice could be addressed with federal legislation providing for expanded federal court jurisdiction.
3. If the committee recommends to the board that the proposal become official and the board approves the recommendation, then the proposal is voted upon by the membership at the annual meeting in August.
4. Secretary of State Warren Christopher said he had approved a recommendation that diplomats' families be withdrawn from the American Embassy in BELGRADE to avoid exposing them to the risk of Serbian retaliation.
5. The House approved a recommendation by the ethics commission that lawyers be allowed to disclose client confidences to prevent reasonably certain death or substantial bodily harm to some person.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"recommendation"** in the phrase **"approve a recommendation"**

Fully opaque — Fully transparent

1 | 2 | 3 | 4 | 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

implement a treaty:

Definition:

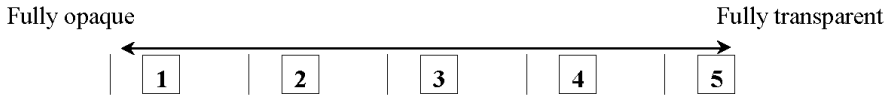
apply a written agreement between two states or institutions in a manner consistent with its purpose or design

Examples:

1. Assad would have to allow inspectors from the Organization for the Prohibition of Chemical Weapons, which implements the treaty, to visit all sites under an agreed timetable to inventory and secure the munitions and facilities.
2. Eves warned that his government would refuse to implement the treaty in the absence of a federal plan to deal with unemployment.
3. But Dmitri Vlassis, a key facilitator of the two-year negotiations leading to the treaty, hopes to get some support from the Nordic nations for a small bureaucracy to help train and advise other nations on how to implement the treaty and call conferences of nations to review progress.
4. His chief economist, Grigory Yavlinsky, has drafted a package of eight agreements designed to implement the treaty to form an economic community that was signed in October.
5. The first protocol ratifies the importance of the accord for Argentina and Brazil and establishes the creation of a commission to implement the treaty (made up of 4 ministers from each country); …

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"implement"** in the phrase **"implement a treaty"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

race the clock:

Definition:

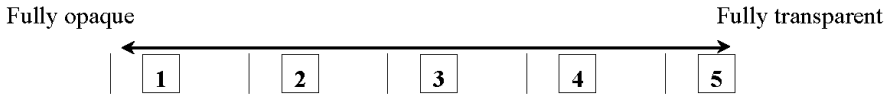
to work as fast as possible towards a goal in competition with time

Examples:

1. … Mildew and mold can develop within 24 to 48 hours of water exposure so many Louisianians flooded have been racing the clock to gut their homes.
2. In Northridge, another drama unfolds. Rescuers race the clock to free a maintenance man buried under a collapsed parking garage.
3. When the U.S. secretary of defense is assassinated at an indoor boxing match, a policeman has to race the clock to find the killer.
4. … Missing was Spain's other great striker, Fernando Torres, who raced the clock to get ready for South Africa after two knee operations this season.
5. … Potomac Electric Power Co. plans to join with other utilities in a preliminary test to determine whether engineers have located and fixed errant software instructions that could otherwise cause critical electric power systems to shut down when the year 2000 dawns. # There will be many such drills in the coming year as companies and government agencies race the clock to safeguard computer systems that keep the economy running.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"clock"** in the phrase **"race the clock"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

impose a penalty:

Definition:

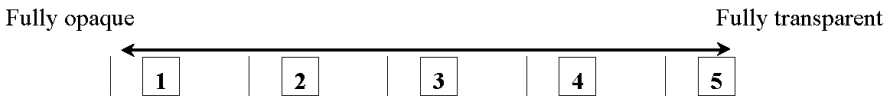
enforce a punishment

Examples:

1. The legislation also imposes a penalty on hospitals with high rates of readmission; roughly 20 percent of Medicare patients are readmitted within 30 days after a hospital discharge.
2. In a majority opinion authored by Chief Justice John Roberts, the court affirmed that denying a " generally available benefit solely on account of religious identity imposes a penalty on the free exercise of religion that can be justified only by a state interest' of the highest order.'
3. Greg Abbott agrees with the judge's ruling that allows a lawsuit challenging the new health care mandate passed by Congress. He further states that never before has Congress imposed a penalty on every American who chooses not to engage in economic activity.
4. Innocent verdicts can not be reversed, and it would take a unanimous verdict to impose the penalty of death.
5. … delayed threats … lose their impact on a toddler or a preschooler, who's too focused on the present moment to remember what she did two minutes ago. The result? It will seem as though there's no consequence for her naughty behavior. And if you do impose a penalty later, it will just seem harsh and arbitrary.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"impose"** in the phrase **"impose a penalty"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

assist recovery:

Definition:

give help in returning to an original state

Examples:

1. The Colorado Department of Transportation will grant use of a 9.6-acre pond along the Colorado River near Debeque to assist recovery of the endangered razorback sucker. The U.S. Fish and Wildlife Service will stock 30,000 young razorbacks in the pond to grow and become more acclimated to a natural environment before being placed in the river this fall.
2. Survival depends on certain factors. One is simply the strain of the virus … In some cases, a transfusion of plasma from a recovered victim has also assisted recovery.
3. Ecological restoration is most often applied to assist the recovery of an ecosystem that has been degraded, damaged, or destroyed.
4. Risking accusations of ingratitude, Jan lost no time in renewing his requests to the Dillenburg chancellery to be allowed to take walks by the city walls, where the air might assist the recovery of his enfeebled health.
5. … European states around the seas have reduced inputs of selected heavy metals and POPs, brought down the number of oil spills, increased the likelihood of catching shipping regulation violators, and assisted the recovery of some high-profile endangered species

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"assist"** in the phrase **" assist recovery"**

Fully opaque — Fully transparent

1 | 2 | 3 | 4 | 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

overcome a barrier:

Definition:

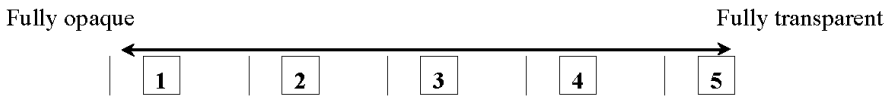
To successfully deal with any condition that makes it difficult to progress or to achieve an objective

Examples:

1. A clear rationale should be provided to justify each accommodation. Continuing to ask if the accommodation will mediate the student's characteristics to overcome the barrier caused by the feature of the tests or testing situation should support the IEP team's efforts to complete this step.
2. A visit to a third-floor office in the high-rise known as the Pyramid in Ghana's capital city, Accra, provides a look at one advanced-technology project that seems to be overcoming the barrier of faulty infrastructure.
3. … the community professional, explained that one teacher working with Latino families directly placed the responsibility for maintaining a home-school connection on the parents: # pre-formatted table Presently, as the responsibility continues to remain with the parents, one way of overcoming the barrier is through the use of community liaisons and resources,
4. … Using a new skin cell model, researchers have overcome a barrier that previously prevented the study of living tissue from people at risk for early heart disease and stroke
5. Although students were initially uneasy about self-taping, listening, and assessing, many students overcame this barrier, and these activities led to further improvement.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"overcome"** in the phrase **"overcome a barrier"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

vary the height:

Definition:

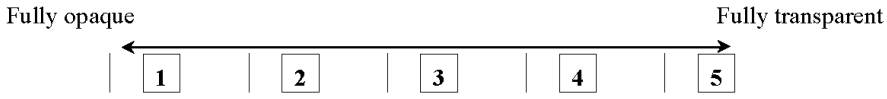
change the distance from the base to the top of something

Examples:

1. … The specifications that follow will produce a bookcase with overall dimensions of 10 3/4in. deep x 34 in. wide x 48 in. tall. While the depth of the case is directly tied to the 1 x 10 stock, you can vary the height, width and shelf spacing to suit your needs.
2. Research assistants varied the height of the piles of plywood boards that were placed against the walkway so that the drop-off depth ranged from 1 to 7 inches with 2-inch increments....
3. To practice this shot, tee up five balls in the sand, each in line with the low point of your swing. Vary the height of each tee, progressively getting lower with each ball until the last one is just a tiny bit above the sand ...
4. First, drill holes through the ends of some clothespins, and then thread a string through each hole and tie the pins to your herb-drying rack or line. Clip a bundle of herbs or flowers to each suspended clothespin. By using different lengths of string, you can vary the height of the herb bundles, which will allow for good air circulation.
5. HAVE FUN WITH DISPLAY: Vary height and depth. Don't just line up items. Put different sizes together, create elevations, stack objects on top of each other or sideways.…

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **" vary the height"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

plant a flag:

Definitions:

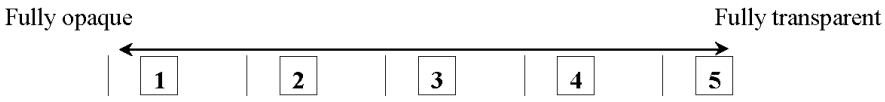
fix securely an emblem usually consisting of a rectangular piece of cloth of distinctive design

Examples:

1. … So the President somehow has to sell this proposition that we're not fighting for a victory to plant the flag and say we won it, we're fighting for a degree of stability and security in this dangerous place.
2. … " And so at last we reached our destination, " Amundsen wrote in his diary on December 14, 191 1, " and planted our flag on the geographical South Pole, King Haakon VIIs plateau. Thank God! ".
3. Man eventually will step onto the surface of Mars, but not merely to plant a flag and come back home .
4. When the Clinton Global Initiative America roared into Denver a year ago, Hillary Clinton used the high power conference to plant a flag in the West's biggest swing state.
5. It was another Hollywood go at World War II, with flurries of enemy machine-gun bullets killing random American soldiers with gory efficacy - the ones who asked their pals if they wanted to live forever, the ones who pined for their mothers, the ones who clowned in the face of the Axis, even the hero who planted the flag of democracy on the beach as he bled to death..

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"flag"** in the phrase **" plant a flag"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

assign priority:

Definition:

give a status in order of importance or urgency

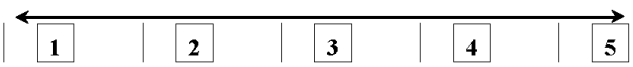
Examples:

1. Few differences emerged between the rural and urban hospital leaders when asked to rank various services according to how essential they are (see table 7). This result suggests that services can be assigned a priority. The service rankings in this study have distinct similarities with the priorities assigned in Oregon, ...
2. … Representative sampling can produce a more respectable basis for individuals to determine how they, as parents, and as members of ethnic groups, accord with or depart from a collective standard. Such a strategy can also support a more equitable allocation of resources by assigning priority to subgroups and to individuals with the greatest need.
3. … Among military men, there's a word for people who look beyond their own particular service to the needs of the broader military " purple " -- a blend of military colors. At the Pentagon, it isn't always a compliment. While other militaries -- British, Canadian, Israeli, German -- have long assigned priority to interservice cooperation, ...
4. The question of why the capital structure of a business entity is hierarchical in priority allocation is best addressed from the viewpoint of the debtor. After all, it is the debtor who decides to assign priority over its assets, by contract or grant of a security interest.
5. … The author assembles and interprets archival materials, advancing a preliminary assessment of the significance of mysticism for the development of Lonergan's intellectual project. Lonergan assigns priority to a mysticism of transforming union as the existential principle from which flow charitable service and theological reflection.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"priority"** in the phrase **" assign priority"**

Fully opaque — Fully transparent



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

adapt a recipe

Definition:

change the directions for making something, to suit a new purpose

Examples:

1. his baked pasta from Ragazza chef Sharon Ardiana is held together by an aged provolone and fontina sauce scented with sage - think of it as a spruced-up macaroni and cheese. At the restaurant, Ardiana plates it individually, but we've adapted the recipe to fit in a large baking dish.
2. We adapted the recipe for standard ovens and, although not smoky in flavor, the herb-and-garlic-seasoned vegetables are equally delicious …
3. You can use any boneless cut of chicken in your freezer, and if you only have ground chicken, you could adapt the recipe for chicken meatballs.
4. I adapted this recipe from Paul Prudhomme's Louisiana Kitchen, and it seems to suit everyone's palate at my house.
5. Marianne Pizzitola of Magnolia Manor Sweets in Sharpsburg says the bakery adapted a recipe to make it gluten- and allergen-free for their bakery and farmers market customers.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **" adapt "**in the phrase **"adapt a recipe"**

Fully opaque — Fully transparent

1 | 2 | 3 | 4 | 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

detect an error:

Definitions:

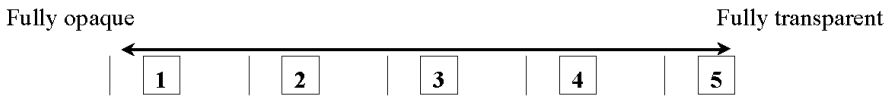
discover a wrong action

Examples:

1. It is also logical that in whole-sentence GJ, essentially a proofreading task, RTs for Bad sentences would be shorter, as less time must pass for the reader to detect the error.
2. In the case of ValuJet 592, a temp for an outside company misread the vague instructions on a shipping ticket, and the intended checks and balances down the line failed to detect the error, as they normally would. So a shipment of unfired oxygen canisters was loaded aboard the plane -- and turned into firebombs.
3. … Machines can automatically inspect fragile small-diameter drills and flag any part that breaks one so that it receives no further machining. Probes are also used to detect an error, such as an undamped work pallet, which, left unfound, could ruin every tool, part, and fixture on the machine as it starts up.
4. Fifteen-year-old Justin Rosenfeld detected an error at a museum, at the Museum of Science in Boston last month.
5. … The resulting short-circuit caused an error in writing the data to memory. Then, once the microprocessor detected an error in the allocation table, it shut down and posted the " Fatal Error " message onscreen.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **"detect an error"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

assess a personality:

Definition:

evaluate all the attributes that characterize a unique individual

Examples:

1. The Sexual Opinion Survey is a 21-item questionnaire that assesses the personality dimension of erotophobia-erotophilia or the " the disposition to respond to sexual cues along a negative-positive dimension of affect and evaluation "
2. … a new book called " Presidential Leadership: Rating the Best and the Worst in the White House. " It's a fascinating collection of essays written by liberals and conservatives assessing the personality and policies of various presidents of the United States.
3. Frequently, observations of behavior and emotional stability conducted across educational, social, and work settings are used to assess personality and interests.
4. This study raises the question of whether failure to assess personality or other person-centered variables in evaluating the relationship of social support to patient well-being may explain, in part, discrepant findings in previous research reported in the literature.
5. … Robins et al. used the constructs of ego-control and ego-resiliency (Block &; Block, 1980) to assess personality and to form personality types.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"personality"** in the phrase **"assess a personality"**

Fully opaque — Fully transparent

1 | 2 | 3 | 4 | 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

embrace diversity

Definition:

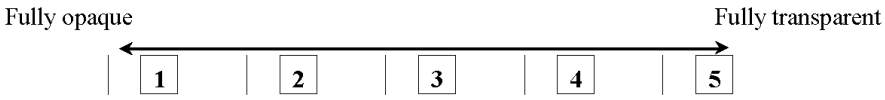
enthusiastically accept the heterogeneity of others

Examples:

1. Multicultural art education should embrace diversity and explore more of the differences in order to foster a deeper understanding of others.
2. In a society such as ours that is built upon and embraces diversity of many kinds, it would be foolish to assume that value changes are ever embraced uniformly.
3. They look past gender and race in ways that baby boomers do not. They embrace diversity, whereas older Americans tend to be wary or even scared of it. So this is an enormous potential asset for Democrats.
4. He highlighted the responsibility of making the team, school, community and world all better. He stressed the importance of loving each other, embracing diversity and focusing on unity instead of division.
5. … " I want to say first of all that I'm proud to be part of an organization and with a region and area that embraces diversity, and there's never been a more important time in our country to respect the person next to you regardless of race, creed, color, sexual preference, sexual identity.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **"embrace diversity"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

arrest the decline:

Definition:

cause a gradual decrease to stop

Examples:

1. … The bank, largely on its own, has arrested the decline of the struggling neighborhood by providing capital, vision and guidance to would-be entrepreneurs and landlords....
2. Here in Asia, home to the world's fastest-growing economies, the problem facing its now affluent societies is how to arrest the decline in their birth rates; ...
3. … A small group of young people on the Prairie Band of Potawatomi Indian Reservation in northeast Kansas decided to arrest the decline of Indigenous language on their reservation, despite scoffing by some there who said, " You can't learn to talk Potawatomi. "...
4. As it moves into the future, Notre Dame must hire at least two-thirds Catholic faculty simply to arrest the decline that ultimately puts at risk its identity as a Catholic school.
5. … George Pipas said Ford's U.S. market share has dropped by one percentage point -- or roughly 150,000 vehicles -- each year for the last five years. Arresting that decline and then stabilizing market share are top priorities in Ford's North American restructuring plan …

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"decline"** in the phrase **" arrest the decline"**

Fully opaque — Fully transparent

1 **2** **3** **4** **5**

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

restore trust:

Definition:

bring back complete confidence in something or someone

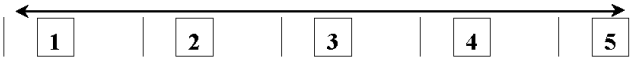
Examples:

1. … Mr. Schneiderman said in a statement. " Nothing could be more critical for both the public and the police officers who work tirelessly to keep our communities safe than acting immediately to restore trust.
2. … And the American people, we need to come back together and restore trust in some of our extant institutions and plan for the future.
3. " We had a productive conversation today about the need to launch a new era of reform where we take on government waste and bitter partisanship in Washington in order to restore trust in government, and bring back prosperity and opportunity for every hardworking American family "
4. We must acknowledge those concerns, and move quickly to restore trust in our public health systems.
5. The public trust is a very important issue, and if we're going to restore the trust and the confidence of the American people in the people who hold public office, you know, these issues, issues of the heart, sometimes issues of conscience, issues of trust are going to be debated, and whether we like it or not.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **"restore trust"**

Fully opaque — Fully transparent



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

monitor pollution:

Definition:

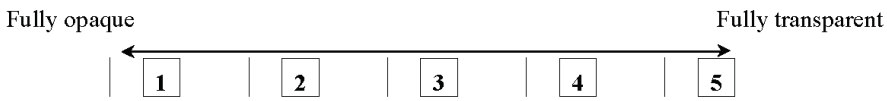
keep an eye on the state of the natural environment being contaminated with harmful substances

Examples:

1. In the mid 1800s, many features of acid rain were discovered and detailed by Robert Angus Smith, who was a chemist and Britain's first Alkali Inspector, or public official who monitored pollution.
2. … Recently, the company asked the State Department of Environmental Conservation to curtail a program that requires it to pay the salaries of two full-time state workers who monitor pollution at one of its Syracuse plants.
3. … One man works for a company that monitors pollution for the industry.
4. Computers and communications equipment are proving a great benefit to the environment, but the disposal of obsolete hardware is causing an ecological headache. // THE SILICON VALLEY Toxics Coalition (SVTC) is a grassroots organization in California that monitors the pollution generated by computer production.
5. … Waste was shunted into a basin that became a black hole of contamination. # When Sherry Skipper first arrived at the site as a young biologist in the early 1990s, she would often don booties, respirators, and goggles to check on starlings she was using, like canaries in a coal mine, to monitor pollution.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"monitor"** in the phrase **" monitor pollution"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

doubt the existence

Definition:

consider it unlikely that something has a state of being

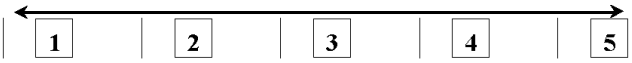
Examples:

1. Melvin walked up slowly, easing down to the ground beside us. " No bears yet? " he said with an exaggerated frown. Even with the clowning, I could tell my West Virginia friends were beginning to doubt the existence of Rocky Mountain black bears. " No, " I said. " I'm going to check out another clearcut, over that way.
2. With the terrorist attacks and the Enron debacle causing so many of us to doubt the existence of goodwill in the world, …
3. Still, anyone doubting the existence of a middle class need only take a trip to the Ikea store in northern Moscow.
4. The Gallup-Castelli book, " The People's Religion: American Faith in the' 90s, " indicates that 9 out of 10 Americans say they have never doubted the existence of God; ...
5. … " Not that I doubt the existence of readers who still understand the prone and speechless dialects of poetry; but they are not as easily to be found in the universities as they were, and there is less of the kind of teaching that trains such readers in the work of reading and recognition.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the phrase **"doubt the existence"**

Fully opaque — Fully transparent



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

rule the universe:

Definition:

exercise authority over everything that exists anywhere

Examples:

1. … As if she ought to be dead. Chance ruled the universe, and chance, on a whim, might have easily sent her plunging to a fiery death with Soren and the others in the commuter plane, placing her under the desert rather than on it.
2. … but people didn't' think the notion of higher dimensions was a reasonable idea. Now, people have started to take this seriously, " says Lykken. # Whether it's dark energy that rules the universe or a kind of gravity that goes beyond what Einstein had imagined remains to be seen ...
3. … well it does support the theory that the Kardashians are ruling the universe.
4. … "The article also suggested that " in the new idea that uncertainty rules the universe, dreamers and mystics will see the abode of their fancies ".
5. In the new life without her husband -- his burial was the first ceremony she had to arrange in the strange and thorny place they had fled to -- Mama Chona clung even more closely to the Catholic God she knew with absolute certainty ruled the universe.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"rule"** in the phrase **"rule the universe"**

Fully opaque — Fully transparent

1 2 3 4 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

yield an insight:

Definition:

supply clear or deep perception of a situation

Examples:

1. Hungary is also of interest because studying it yields insight into how nations of the former Soviet bloc are interpreting their years of Communist rule and how commemorative traditions respond to changes of political regime.
2. A survey of recent graduates who successfully landed teaching positions was conducted to provide practical information for future teachers and the university personnel and faculty who may assist them with this process. The survey yielded insight as to the format and content of the interview and other factors which school district personnel may examine when making their decisions.
3. … scientists are starting to figure out what magicians have known for ages - how your brain can play tricks on you. "... " These new techniques promise to give scientists front-row seats to magic's action in the brain and may yield insight into the very basis of consciousness itself.
4. He has made many significant and lasting contributions, usually as the first to demonstrate that computational approaches are both feasible and likely to yield insight into physical phenomena.
5. … studying the scores of successful, established composers/arrangers yields insight into common orchestration practices.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"insight"** in the phrase **" yield an insight"**

Fully opaque — Fully transparent

1 | 2 | 3 | 4 | 5

Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

How transparent in meaning ...?

inform selection:

Definition:

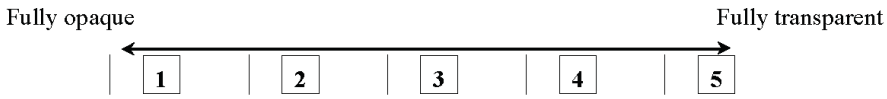
give character or essence to the act of choosing

Examples:

1. The special educators use their knowledge of the regular education curriculum and classroom routines to inform selection of those skills but ultimately have responsibility for determining the skills curriculum, much as the content-area teachers do for their curriculum.
2. An exploratory study investigated which formats of digitally preserved objects users preferred and indicated that archivists can benefit from understanding " how user needs and preferences may inform selection of preservation methods.
3. … Evaluate and document contractor performance to inform selection of future contractors.
4. The basis of the design was a participant selection model in which quantitative and qualitative data are collected in two phases -- quantitative data in the first phase informs the selection of participants for the second qualitative phase.
5. Ultimately, lost earnings calculations become problematic in cases where there is no information regarding individualized features such as educational attainment or career trajectory to help inform the selection of an anticipated annual base salary.

Note: Please select the answers below carefully based on the most frequent meaning of the phrase in the examples:

Step 1: Score of 0-5 for how transparent in meaning is the use of **"inform"** in the phrase **" inform selection"**



Please provide any comments in case you want to or any other queries/suggestions! Not Mandatory but helpful.

Appendix C: Sample of consent form and information sheet of the participants in transparency rating

PARTICIPANT CONSENT FORM

NAME OF PARTICIPANT:

Title of the project: The role of semantic transparency in the acquisition of L2 collocations by learners of EFL.

Main investigator and contact details: Houriah Aldosari
Email: Houriah.aldosari@pgr.anglia.ac.uk
tel: 07538405111

Members of the research team:
First supervisor: Dr Melanie Bell. Second supervisor: Dr Michelle Sheehan

1. I agree to take part in the above research. I have read the Participant Information Shee 01.05.17 V1) for the study. I understand what my role will be in this research, and all my questions have been answered to my satisfaction.

2. I understand that I am free to withdraw from the research at any time, without giving a r

3. I am free to ask any questions at any time before and during the study.

4 I understand what will happen to the data collected from me for the research.

5. I have been provided with a copy of this form and the Participant Information Sheet.

Data Protection: I agree to the University[1] processing personal data which I have supplied. I agree to the processing of such data for any purposes connected with the Research Project as outlined to me*

Name of participant (print)…… Signed…….. Date……

Name of person
witnessing consent (print)…… Signed…….. Date……

I WISH TO WITHDRAW FROM THIS STUDY.

If you wish to withdraw from the research, please speak to the researcher or email them at Houriah.aldosari@pgr.anglia.ac.uk stating the title of the research.
You do not have to give a reason for why you would like to withdraw.
Please let the researcher know whether you are/are not happy for them to use any data from you collected to date in the write up and dissemination of the research.

[1] "The University" includes Anglia Ruskin University and its Associate Colleges.

PARTICIPANT INFORMATION SHEET

Section A: The Research Project

Title of project

The role of semantic transparency in the acquisition of L2 collocations by Arabic learners of EFL

Brief summary of research.

The research aims to investigate the role of the relative semantic transparency in the learnability of L2 collocations by English as a Foreign Language (EFL) learners in general, and Arabic speakers in particular. 100–300 Saudi students, who are studying EFL in an intermediate school in Saudi Arabia, will receive four weeks of training sessions on 44 collocations with various degrees of semantic transparency. The learnability of these items will be tested at the end of the training phase.

Purpose of the study

The research is being carried out as part of the researcher's PhD degree in Languages and Intercultural Communication at Anglia Ruskin University

Name of the researcher's supervisor

First supervisor: Dr Melanie Bell
Second supervisor: Dr Michelle Sheehan

Why have I been asked to participate?

you are being asked to participate in this research, because you are native speaker of English with training in linguistics and/or English language teaching.

How many people will be asked to participate?

Approximately 20-30

What are the likely benefits of taking part?

The study will provide useful information about the extent to which English collocations' degree of semantic transparency could affect their acquisition by EFL learners. This information may lead to a better understanding of L2 collocations' acquisition which are important for mastery of second language. Students taking part in the study will benefit from having a chance at learning new 60 English collocations However, it is unlikely that there will be any direct benefits to participants who will take part in the semantic transparency ratings.

Can I refuse to take part?

Taking part in this research is completely voluntary. You can decline to participate, or withdraw from the study, at any time without any explanation and for any reason.

Has the study got ethical approval?

The study has ethical approval from the Departmental Research Ethics Panel (DREP) within the Faculty of Arts, Law and Social Sciences at Anglia Ruskin University.

Has the organisation where you are carrying out the research given permission?

Permission from an intermediate school in Riyadh, Saudi Arabia, where the study will be carried out, has been obtained for this research.

Source of funding for the research, if applicable.
This research is funded by the researcher' scholarship offered by Saudi Arabian Cultural Bureau.

What will happen to the results of the study?

The research will be written up for a doctoral thesis and submitted to Anglia Ruskin University. The study may also be published in journals, or books or presented at conferences. When the results of the study are published, participants' personal details will not be identified.

Contact for further information

Houriah Aldosari
Doctorate Researcher
Email: Houriah.aldosari@pgr.anglia.ac.uk
tel: 07538405111

Section B: Your Participation in the Research Project

What will I be asked to do?

You are being asked to take part in the first part of the research which is the completion of semantic transparency rating task. This task consists of items that will be considered for inclusion in the main testing instrument of the research. It takes approximately 30 minutes for the completion of this task.

Will my participation in the study be kept confidential?

Yes. Every attempt will be made to ensure anonymity of the participants. The results will be written up in a way that means it will not be possible to identify who completed the task. Participants' personal data will not be included in dissemination. The only people that will see the completed tasks are myself and the Supervisors listed above.

Will I be reimbursed travel expenses?

Participants will be compensated (up to 20 pounds per participant) for their time upon completion of the rating task.

Are there any possible disadvantages or risks to taking part?

None. The research student is not aware of any risk in taking part in this research study. Participating in the study does not affect the participant's legal rights

Whether I can withdraw at any time, and how.

Participants can withdraw from the study at any time and without giving a reason. However, once you have submitted your responses to rating task, it will not be possible to remove your data from the study.

Whether there are any special precautions you must take before, during or after taking part in the study.

None.

What will happen to any data that are collected from you?

Data will be collected using a semantic rating task and will be analyzed statistically using an SPSS package. The Data Protection Act 1988 applies to all the answers given on the rating task and they will be only available to the researcher and her supervisors during the completion of this research study. During the study, all collected data will be stored securely. The paper rating tasks will be locked away and destroyed after the thesis is published. Only a summary of the findings from the task will be published.

Contact details for complaints.

If you have any complaints about the study, please speak to me or one of the Supervisors in the first instance. They can be contacted on the following details:

Dr. Melanie Bell: email: melanie.bell@anglia.ac.uk
Dr. Michelle Sheehan: email: michelle.sheehan@anglia.ac.uk

Or alternatively if you feel your complaint has not been dealt with to your satisfaction then please contact Anglia Ruskin University:

Email address: complaints@anglia.ac.uk
Postal address: Office of the Secretary and Clerk, Anglia Ruskin University, Bishop Hall Lane, Chelmsford, Essex, CM1 1SQ.

Appendix D: Sample of the students' consent form and information sheet

Participant Consent Form

The Role of Semantic Transparency in the Acquisition of Collocations by Arabic Learners of English as Foreign Language

Name of Researcher: Houriah Aldosari, (Houriah.aldosari@pgr.anglia.ac.uk)

Name of Participant:

The participant (or if unable, parent or guardian on their behalf) to circle all they agree with:

- Have you read the information sheet? Yes/ No
- Has someone explained this study to you? Yes/ No
- Do you understand what this study is about? Yes/ No
- Did someone answer your questions about this study? Yes/ No
- Do you understand it's OK to stop joining in this study at any time? Yes/ No
- Have you been provided with a copy of this form and the Participant Information Sheet? Yes/ No
- Are you happy to take part? Yes/ No

If any answers are 'no' or you do not want to take part, do not sign your name!
If you do want to take part, you can write your name below

Your Name: …… Signature: …… Date: ……

Your parent/guardian: ……..... Signature: …… Date ……..

Name of Person witnessing assent: ……Signature: …..……..Date:……..……

(Please note that this consent form will be translated into Arabic before use in the study.)

Anglia Ruskin University

PARTICIPANT INFORMATION SHEET

Section A: The Research Project

Title of project

The role of semantic transparency in the acquisition of L2 collocations by Arabic learners of EFL

Brief summary of research.

The research aims to investigate the role of the relative semantic transparency in the learnability of L2 collocations by English as a Foreign Language (EFL) learners in general, and Arabic speakers in particular. 100–300 Saudi students, who are studying EFL in an intermediate school in Saudi Arabia, will receive four weeks of training sessions on 60 collocations with various degrees of semantic transparency. The learnability of these items will be tested at the end of the training phase.

Purpose of the study

The research is being carried out as part of the researcher's PhD degree in Languages and Intercultural Communication at Anglia Ruskin University

Name of your Supervisor

First supervisor: Dr Melanie Bell
Second supervisor: Dr Michelle Sheehan

Why have I been asked to participate?

You are being asked to participate in this research, because you are Saudi student aged 14-15, studying EFL in grade 8 in an intermediate school in Saudi Arabia. Your level of English proficiency is a pre-intermediate (A2) and your native language is Arabic.

How many people will be asked to participate?

Approximately100–300 students.

What are the likely benefits of taking part?

The study will provide useful information about the extent to which English collocations' degree of semantic transparency could affect their acquisition by EFL learners. This information may lead to a better understanding of L2 collocations' acquisition which are important for mastery of second language. Students taking part in the study will benefit from having a chance at learning new 44 English collocations.

Can I refuse to take part?
Taking part in this research is completely voluntary. You can decline to participate, or withdraw from the study, at any time without any explanation and for any reason.

Has the study got ethical approval?

The study has ethical approval from the Faculty Research Ethics Panel (FREP) within the Faculty of Arts, Law and Social Sciences at Anglia Ruskin University.

Has the organisation where you are carrying out the research given permission?

Permission from an intermediate school in Riyadh, Saudi Arabia, where the study will be carried out, has been obtained for this research.

Source of funding for the research, if applicable.
This research is funded by the researcher' scholarship offered by Saudi Arabian Cultural Bureau.

What will happen to the results of the study?

The research will be written up for a doctoral thesis and submitted to Anglia Ruskin University. The study may also be published in journals, or books or presented at conferences. When the results of the study are published, participants' personal details will not be identified.

Contact for further information

Houriah Aldosari
Doctorate Researcher
Email: Houriah.aldosari@pgr.anglia.ac.uk
tel: 07538405111

Section B: Your Participation in the Research Project

What will I be asked to do?

You will be pretested for your vocabulary level and prior familiarity with the experimental items to ensure your suitability to take part in the training phase of this study. You will also, be asked to complete a background questionnaire Then, you will receive four weeks of training sessions on 60 collocations with various degrees of semantic transparency. The learnability of these items will be tested at the end of the training phase with two instruments, which will be administrated, separately, a week apart.

Will my participation in the study be kept confidential?

Yes. Every attempt will be made to ensure anonymity of the participants. The results will be written up in a way that means it will not be possible to identify the participants in this study. Participants' personal data will not be included in dissemination. The only people that will see the completed tasks are myself and the supervisors listed above.

Are there any possible disadvantages or risks to taking part?

None. The research student is not aware of any risk in taking part in this research study. Participating in the study does not affect the participant's legal rights

Whether I can withdraw at any time, and how.

Participants can withdraw from the study at any time and without giving a reason, by speaking to the researcher or emailing her at Houriah.aldosari@pgr.anglia.ac.uk stating the title of the research. However, once you have submitted your responses to the both collocation tests, it will not be possible to remove your data from the study.

Whether there are any special precautions you must take before, during or after taking part in the study.

None.

What will happen to any data that are collected from you?

Data will be collected using two collocations tests and will be analyzed statistically using an SPSS package. The Data Protection Act 1988 applies to all the answers given on the tests and they will be only available to the researcher and her supervisors during the completion of this research study. During the study, all collected data will be stored securely. The paper answered tests will be locked away and destroyed after the thesis is published. Only a summary of the findings from the task will be published.

Contact details for complaints.

If you have any complaints about the study, please speak to me or one of the Supervisors in the first instance. They can be contacted on the following details:

Dr. Melanie Bell: email: melanie.bell@anglia.ac.uk
Dr. Michelle Sheehan: email: michelle.sheehan@anglia.ac.uk

Or alternatively if you feel your complaint has not been dealt with to your satisfaction then please contact Anglia Ruskin University:

Email address: complaints@anglia.ac.uk
Postal address: Office of the Secretary and Clerk, Anglia Ruskin University, Bishop Hall Lane, Chelmsford, Essex, CM1 1SQ.

Date 01.06.17
V1

Appendix E: A sample of the modified VLT

Vocabulary Level Test

This is a vocabulary test. You must choose the right word to go with each meaning. Write the number of that word next to its meaning. Here is an example.

l	business	
2	book	_____ part of a house
3	horse	_____ animal with four legs
4	pencil	_____ something used for writing
5	shoe	
6	wall	

You answer it in the following way.

l	business	
2	book	___*6*__ part of a house
3	horse	___*3*__ animal with four legs
4	pencil	___*4*__ something used for writing
5	shoe	
6	wall	

Some words are in the test to make it more difficult. You do not have to find a meaning for these words. In the example above, these words are business, clock, and shoe.

If you have no idea about the meaning of a word, do not guess. But if you think you might know the meaning, then you should try to find the answer.

Name: …….

Version 1 The 2,000 word level

1 birth
2 dust _____ game
3 operation _____ winning
4 row _____ being born
5 sport
6 victory

1 choice
2 crop _____ heat
3 flesh _____ meat
4 salary _____ money paid regularly for doing a job
5 secret
6 temperature

1 cap
2 education _____ teaching and learning
3 journey _____ numbers to measure with
4 parent _____ going to a far place
5 scale
6 trick

1 attack
2 charm _____ gold and silver
3 lack _____ pleasing quality
4 pen _____ not having something
5 shadow
6 treasure

1 cream
2 factory _____ part of milk
3 nail _____ a lot of money
4 pupil _____ person who is studying
5 sacrifice
6 wealth

1 adopt
2 climb _____ go up
3 examine _____ look at closely
4 pour _____ be on every side
5 satisfy
6 surround

1 bake
2 connect _____ join together
3 inquire _____ walk without purpose
4 limit _____ keep within a certain size
5 recognize
6 wander

1 burst
2 concern _____ break open
3 deliver _____ make better
4 fold _____ take something to someone
5 improve
6 urge

1 original
2 private _____ first
3 royal _____ not public
4 slow _____ all added together
5 sorry
6 total

1 brave
2 electric _____ commonly done
3 firm _____ wanting food
4 hungry _____ having no fear
5 local
6 usual

Version 2 The 3,000 word level

1 bull
2 champion _____ formal and serious manner
3 dignity _____ winner of a sporting event
4 hell _____ building where valuable objects are shown
5 museum
6 solution

1 blanket
2 contest _____ holiday
3 generation _____ good quality
4 merit _____ wool covering used on beds
5 plot
6 vacation
1 comment
2 gown _____ long formal dress
3 import _____ goods from a foreign
4 nerve country
5 pasture _____ part of the body which carries feeling
6 tradition

1 administration
2 angel _____ group of animals
3 frost _____ spirit who serves God
4 herd _____ managing business and affairs
5 fort
6 pond

1 atmosphere
2 counsel _____ advice
3 factor _____ a place covered with grass
4 hen _____ female chicken
5 lawn
6 muscle

1 abandon
2 dwell _____ live in a place
3 oblige _____ follow in order to catch
4 pursue _____ leave something permanently
5 quote
6 resolve

1 assemble
2 attach _____ look closely
3 peer _____ stop doing something
4 quit _____ cry out loudly in fear
5 scream
6 toss

1 drift
2 endure _____ suffer patiently
3 grasp _____ join wool threads together
4 knit _____ hold firmly with your hands
5 register
6 tumble

1 brilliant
2 distinct _____ thin
3 magic _____ steady
4 naked _____ without clothes
5 slender
6 stable

1 aware
2 blank _____ usual
3 desperate _____ best or most important
4 normal _____ knowing what is happening
5 striking
6 supreme

Appendix F: Sample of Prior Familiarity Task

WORD FAMILIARITY TASK

This test estimates your familiarity with 94 different English words. You will be presented with these words on the following pages.

Your task is to:

First rate how familiar you are with each word on a 4-point rating scale by circling a number from 1 to 4,

Second to write the meaning of ONLY the words you know either in English / Arabic.

Please use the following guide to help you decide which number to circle:

1. (Know very well): “You know the word very well and you are sure that you know the meaning of the word”.
2. (Have seen/heard it but not very sure about its meaning): “You have seen / heard the word before but you are not certain that the meaning you know is correct”.
3. (May have seen/heard it but do not know its meaning): “You think you have seen / heard the word before, but you don't know the meaning of the word”.
4. (Do not know at all): “You have never seen / heard the word before”.

I don't expect you to know all of these words. Don't be concerned if there are many words you have never seen / heard before. Please be sure to give an answer to every word.
If you have any questions, please ask the researcher.

Name: ……

1. existence	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
2. distribute	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
3. emotion	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
4. reputation	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
5. territory	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
6. doubt	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

7. appeal	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
8. contact	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
9. reflection	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
10. height	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
11. viewer	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
12. trust	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
13. shape	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
14. overcome	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

15. permit	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
16. decline	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
17. suggestion	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
18. imagination	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
19. practice	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
20. accomplish	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
21. request	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
22. arrest	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

23. infection	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
24. phrase	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
25. impose	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
26. waste	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
27. craft	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
28. plant	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
29. electricity	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
30. detect	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

31. exhibition	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
32. accompany	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
33. race	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
34. resist	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
35. cast	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
36. approve	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
37. entry	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
38. delivery	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

39. recommendation	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
40. exercise	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
41. occupy	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
42. treaty	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
43. display	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
44. embrace	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
45. bury	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
46. inform	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

47. personality	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
48. possess	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
49. wedding	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
50. recovery	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
51. curriculum	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
52. channel	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
53. talent	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
54. load	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

55. approval	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
56. selection	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
57. flag	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
58. universe	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
59. assign	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
60. clock	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
61. error	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
62. diversity	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

63. negotiate	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
64. process	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
65. celebrate	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
66. switch	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
67. restore	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
68. translate	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
69. enhance	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
70. pollution	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

71. adapt	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
72. penalty	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

73. rule	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
74. vary	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
75. manufacturer	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
76. sentence	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
77. secure	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
78. monitor	Know very well.	Have Seen/heard it, but not very sure about its meaning.	May have seen/heard it, but do not know its meaning. **3**	Do not know at all.	Meaning in English / Arabic. ……

	1	**2**		**4**	
79. objective	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
80. arrange	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
81. assess	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
82. priority	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
83. implement	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
84. deserve	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
85. assist	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

86. arrangement	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
87. barrier	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
88. balance	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
89. award	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
90. insight	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
91. enable	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
92. recipe	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……
93. dismiss	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

94. yield	Know very well. **1**	Have Seen/heard it, but not very sure about its meaning. **2**	May have seen/heard it, but do not know its meaning. **3**	Do not know at all. **4**	Meaning in English / Arabic. ……

Appendix G: Questionnaire about Task Quality

Test Validation Questionnaire

Questions about the test that you just finished.

Put a cross in the scale under each question, and feel free to add any comments you might have on the dotted line under the scale.

1 How did you perceive the test instruction?

Very easy to understand	Easy to understand	OK	hard to understand	very hard to understand

<--------|----------|----------|----------|----------|------->

Comment: ……..

2 How did you perceive the difficulty level of the test?

very easy	easy	average	difficult	very difficult

<--------|----------|----------|----------|----------|------->

Comment: ……..

3 What feeling do you associate with the process of doing the test?

very appealing	appealing	OK	boring	very boring

<--------|----------|----------|----------|----------|------->
Comment: ……

4 In your opinion, what kind of knowledge is measured in the test? (e.g. recognition, production or both)

……

……

……

……

Appendix H: Sample of instructional materials used in single word teaching phase

1st Session

1. **Distribute electricity**
2. **Assist recovery**
3. **Arrest the decline**

- They built more power lines to **distribute electricity** to millions of people, especially in areas where there is great need. This way people in every house will have air conditioners, lights and radios.

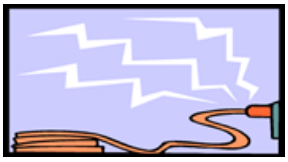
dis·trib·ute

part of speech: verb

definition 1:	to divide into parts and give out to each of several people or groups. *The teacher **distributed** the tests to her students.*
definition 2:	to spread over an area; scatter. *The farmer **distributed** the seeds over the field.*

e·lec·tric·i·ty

part of speech: noun

definition 1:	energy caused by the movement of electrons through matter. *Lightning is a natural form of **electricity**.*
definition 2:	electrical current. *The television needs **electricity** in order to work* 
definition 3:	a state of tension or excitement. *When the game became tied you could feel the **electricity** in the crowd.*

Appendix I: Sample of exercises used in single word teaching phase

1st Session (Individual Words Teaching)

(Activity 1) Instructions: Choose the best answer/word for each definition.

1. a return to a normal condition or to good health.
- ○ distribute
- ○ decline
- ○ assist
- ◉ recovery

2. to divide into parts and give out to each person or group.
- ○ arrest
- ◉ distribute
- ○ decline
- ○ assist

3. a kind of energy that is used for light and heat and for making things operate.
- ○ arrest
- ○ decline
- ◉ electricity
- ○ recovery

4. a drop or loss.
- ○ recovery
- ○ electricity
- ○ distribute
- ◉ decline

5. to give help to someone.
- ○ recovery
- ○ decline
- ○ distribute
- ◉ assist

6. to stop and hold someone for breaking the law.
- ◉ arrest
- ○ electricity
- ○ distribute
- ○ assist

(Activity 2) Instructions: Complete these sentences using the words on this list

●arrested ● assisted ● decline ● distributed ● electricity ● recovery

1. The supervisor……safety goggles to the workers.
2. The police……... the criminal and brought him to jail.
3. Lightning is a natural form of……... _____.
4. Last year, there was a …….in the number of crimes.
5. We wished her a quick ……from her operation.
6. The nurse ……...the doctor with the operation.

Appendix J: Sample of instructional materials used in collocation teaching phase

1st Session

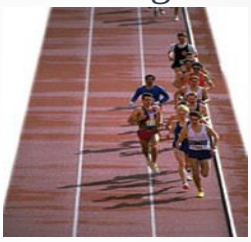
1. **Shape the curriculum**
2. **Race the clock**
3. **Embrace diversity**
4. **Practice a craft**
5. **Rule the universe**

1. Shape the curriculum

- In this school, only head teachers have the power to **shape** the **curriculum** as they like.
- Both students and teachers have **shaped** the **curriculum** so that it includes some useful computer games.

2. Race the clock

- Tom had to **race** the **clock** to get to the airport on time.



- I have to **race** the **clock** to get ready for the science fair next week.

3. Embrace diversity

- People have different religions, nationalities, colors etc. and the key to have a friendlier world is to **embrace** the **diversity** of all people around the world.

- It's so important that young people **embrace diversity** and feel happy with who they are, and their differences.

4. Practice a craft

- She is one of the few women in the country who is able to **practice** the **craft** of glass painting.

- Painters **practice** a **craft** that is thousands of years old, the famous painting ‘Mona Lisa’ was painted in 1503 or 1504.

5. Rule the universe

- It is hard to explain how God **rules** the **universe** but no one else can do it.

- Everyone knows that Italian skills **rule** the **universe** of men's wear style.

Appendix K: Sample of exercises used in collocation teaching phase

1st Session (Collocations Teaching)

(Activity 1) Instructions: Choose the best answer/collocation for each definition.

7. (مارس حرفه) carry out a skill in an occupation or trade.
- ○ Shape the curriculum
- ○ Race the clock
- ○ Embrace diversity
- ○ Practice a craft
- ○ Rule the universe

8. (شكل المنهج) give form to an integrated course of academic studies.
- ○ Shape the curriculum
- ○ Race the clock
- ○ Embrace diversity
- ○ Practice a craft
- ○ Rule the universe

9. (حكم الكون) exercise authority over everything that exists anywhere.
- ○ Shape the curriculum
- ○ Race the clock
- ○ Embrace diversity
- ○ Practice a craft
- ○ Rule the universe

10. (تقبل الاختلاف) enthusiastically accept the heterogeneity of others.
- ○ Shape the curriculum
- ○ Race the clock
- ○ Embrace diversity
- ○ Practice a craft
- ○ Rule the universe

11. (سابق الساعة) to work as fast as possible towards a goal in competition with time.
- ○ Shape the curriculum
- ○ Race the clock
- ○ Embrace diversity
- ○ Practice a craft
- ○ Rule the universe

(Activity 2) Instructions: Complete these sentences with the correct collocation using its translated meaning.

1. The driver had to _____ (سابق الساعة) **race the clock ___**to get to the finish line before the other drivers did.

2. All books should____ (تقبل الاختلاف) **embrace diversity** ___and teach us to accept that everyone is different.

3. You must___ (مارس حرفه) **practice the craft** ___of shoemaking for a long time to become a true expert.

4. Everybody thinks that Michael Jordan have and will always___ (حكم الكون) **rule universe** ___of basketball more than any other player.

5. The school will give students the chance to__(شكل المنهج) **shape the curriculum** __of their English course as they like.

Appendix L: Sample of collocation production test

Collocation Production Test

Instructions:

The sentences below are each missing two or three words in a row. Your job is to complete the sentences by circling the most natural combination of words to go in the box. You may choose only one word from each column.

Example 1

You need to study a lot because that is the only way you will [ ] w.	see pass work	a/an the --	test answer book

Answer1

You need to study a lot because that is the only way you will [ ] norrow.	see pass work	a/an the --	test answer book

Example 2

If I bring my cellphone on the school trip tomorrow, I will only use it to [ ]	take hold cut	a/an the --	paper paint pictures

Answer 2

If I bring my cellphone on the school trip tomorrow, I will only use it to [ ]	take hold cut	a/an the --	papers paint pictures

2. I did not believe my eyes when I saw a white tiger in India, and that is why I will n [ ] of anything anymore.	embrace bury doubt	a/an the --	diversity existence reflection

3. The school will not [ ] of any student into the classroom after the test has started.	permit yield	a/an the	recipe viewer

	adapt	--	entry

4. Some doctors have told him to go to a drier country because the dry ____ of his poor health.	approve assist assess	a/an the --	recovery electricity infection

5. It can be hard for writers who write about real stories t____ because there is no room for adding or changing.	bury race exercise	a/an the --	waste imagination curriculum

6. I have to teach my dog how to be friendly, because the judges in the Dog Show ____ of the dogs as well as their looks.	assess deserve translate	a/an the --	phrase personality barrier

7. Our school is helping students to ____ of other students with different cultures, colors and religions.	occupy shape embrace	a/an the --	territory diversity penalty

8. If you're not sure how to clean the microwave safely, ____ advice and they will be able to help you.	contact monitor enhance	a/an the --	load pollution manufacturer
9. Many car accidents happen because some drivers look away from the road ____ on the radio.	deserve switch arrange	a/an the --	awards emotions channels

10. The coach's report will ____ of the boys who will be part of the swimming team.	cast inform translate	a/an the --	selection reflection wedding

11. The new network will be able to ____ to more than 13 million houses in the country.	dismiss doubt	a/an the	recovery electricity

	distribute	--	existence

12. You should put at least 10 shirts or more in the washing machine to _____ if you want it to work well.	arrest balance impose	a/an the --	error penalty load

13. The teacher has tried to _____ to include fun activities, which is what her students need.	shape accompany exercise	a/an the --	exhibition curriculum existence

14. People who eat fruits and vegetables every day are abl_____ more successfully than those who do not.	negotiate implement resist	a/an the --	infections treaties reputations

15. He asked me to _____ from Arabic into English, but I do not speak English very well.	assign assist translate	a/an the --	phrase priority imagination
16. There are television programs that _____ to talk back to their television and chat with other people.	ble display distribute	a/an the --	emotions viewers treaties

17. When his mother asked him about the broken window, Ali did not _____ that he knew who broke it.	switch dismiss accomplish	a/an the --	objective suggestion selection

18. My friends are always helpful and polite to all students. I think th_____ for best-behaved students in the school.	deserve process race	a/an the --	clock award diversity

19. The school did not _____ from the parents to open more classes for special needs students.	arrest approve	a/an the	imagination reputation

	enhance	--	recommendation

20. These new chairs are very comfortable to sit on because you can [ ] of the chair to go with your body shape.	vary inform possess	a/an the --	talent priority height

21. Both countries want to [ ] of peace that will end the ten years long war.	contact implement balance	a/an the --	manufacturer treaty pollution

22. In 2011 people in the UK had a national holiday to [ ] Prince William and Kate Middleton.	distribute yield celebrate	a/an the --	wedding territory electricity
23. The store will be closing in less than half an hour, so I have t[ ] to find a dress for the dance tonight.	plant race cast	a/an the --	clock flag entry

24. Since 2016 Saudi Arabia has started to [ ]ry on drivers who eat or drink while driving.	assist impose	a/an the --	craft penalty recovery

25. It is important for mothers to [ ] of love and care to their children so they know they are loved.	arrange display overcome	a/an the --	infections barriers emotions

26. You can [ ] for lemon cake to make chocolate cake by using chocolate instead of lemon.	adapt rule dismiss	a/an the --	universe recipe trust

27. One way scientists [ ] of seawater is by looking at any unusual changes in water color.	monitor accompany	a/an the	craft

	practice	--	objective
			pollution

28. Scoring 5 goals in one game will [ ]sist of the football team who have never won a game.		a/an	reputation
	implement	the	exhibition
	enhance	--	infection

29. The moonlight can [ ] onto the water, which could look like a second moon.	dismiss	a/an	reflection
	cast	the	suggestion
	arrange	--	personality
30. The store manager is looking for a way to [ ] in the sales of men's clothes before the end of the year		a/an	selection
	contact	the	award
	inform	--	decline

31. The worker said before they can [ ] for a new ID card, you need to have a colored new photo.	assign	a/an	entry
	impose	the	request
	process	--	penalty

32. Cats usually like to share. So, a cat may [ ]ace in the morning but leave it for another cat in the afternoon.		a/an	territory
	occupy	the	clock
	vary	--	flag

33. Finding air in a new planet may [ ] into the possibility of living on a planet other than the earth.	yield	a/an	barrier
	overcome	the	insight
	assign	--	height

34. One of the common ways that can help in having a cleaner earth is to [ ] deep in the sea.	enable	a/an	waste
	bury	the	viewer
	overcome	--	talent

35. In order to become a famous writer, you probably have to ____ writing for more than 5 years.	practice monitor permit	a/an the --	entry height craft
36. If you have many tasks to do, you need to ____ to the most important one and do it first.	assign restore	a/an the --	clock trust priority
37. We were so happy to be able to ____ in our science project before we gave it to the class teacher.	oubt arrest detect	a/an the --	universe error decline
38. I am still trying to ____ of mine for the year 2018 which is to become a vegetarian.	accomplish enhance exercise	a/an the --	imagination request objective
39. Neil Armstrong was the first man to walk on the moon and ____ his country on it.	adapt detect plant	a/an the --	channel flag error
40. Before you leave a job, try to ____ with your boss to make your leaving a lot easier.	celebrate negotiate deserve	a/an the --	imagination arrangement wedding
41. People who make their dreams come true have learned how t ____ that stood in their way.	overcome assess balance	a/an the --	personalities barriers recommendations
42. Sarah wrote two great stories in less than a month. I think she may ____ r writing.	balance assign possess	a/an the --	talent decline load

43. A book will [ ] which will include some pictures of the main paintings.	accompany	a/an	exhibition
	negotiate	the	manufacturer
	overcome	--	arrangement

44. Some scientists believe that dark matter [ ]tes better than other forms of matter like stars.		a/an	award
	rules	the	waste
	deserves	--	universe

45. The company plans to use a new type of oil in future as a way to [ ]ts cars.	vary	a/an	trust
	process	the	recipe
	restore	--	height

Appendix M: Sample of collocation recognition test

INSTRUCTION:

This part consists of 63 word combinations (1-63). Your task is to decide whether the word combinations are used in the English language or not.

If you think a word combination is used in the English language, tick the 'yes' box. If you don't think a word combination is used in the English language, tick the 'no' box.

Please make sure that you have answered all test items.

Example

64 go a smile		65 take a picture		66 do tea	
	yes	X	yes		yes
X	no		no	X	no

In the example above, word combination 65, 'take a picture' has been chosen as an existing word combination in English whereas word combinations 64 and 66 have been chosen as not existing.

PART A

restore trust
☐ yes
☐ no

embrace the imagination
☐ yes
☐ no

implement a treaty
☐ yes
☐ no

deserve an award
☐ yes
☐ no

exercise a reputation
☐ yes
☐ no

monitor pollution
☐ yes
☐ no

assign priority
☐ yes
☐ no

monitor a request
☐ yes
☐ no

arrest the decline
☐ yes
☐ no

0 vary the height
☐ yes
☐ no

1 deserve pollution
☐ yes
☐ no

2 translate a phrase
☐ yes
☐ no

3 cast a reflection
☐ yes
☐ no

4 contact the manufacturer
☐ yes
☐ no

5 enable the viewer
☐ yes
☐ no

6 occupy a selection
☐ yes
☐ no

7 doubt an award
☐ yes
☐ no

8 distribute electricity
☐ yes
☐ no

9 enable a priority
☐ yes
☐ no

0 balance a load
☐ yes
☐ no

1 accompany an exhibition
☐ yes
☐ no

2 enhance someone's reputation
☐ yes
☐ no

3 inform a reflection
☐ yes
☐ no

4 shape the curriculum
☐ yes
☐ no

PART B

5 exercise the imagination
☐ yes
☐ no

6 assist a barrier
☐ yes
☐ no

7 rule the universe
☐ yes
☐ no

8 detect an error
☐ yes
☐ no

9 assign an entry
☐ yes
☐ no

0 dismiss a suggestion
☐ yes
☐ no

1 permit entry
☐ yes
☐ no

2 plant a flag
☐ yes
☐ no

3 inform selection
☐ yes
☐ no

4 yield an insight
☐ yes
☐ no

5 impose talent
☐ yes
☐ no

6 assist recovery
☐ yes
☐ no

7 race the clock
- ☐ yes
- ☐ no

8 cast a personality
- ☐ yes
- ☐ no

9 possess (a) talent
- ☐ yes
- ☐ no

0 accomplish an objective
- ☐ yes
- ☐ no

1 overcome a barrier
- ☐ yes
- ☐ no

2 accomplish an exhibition
- ☐ yes
- ☐ no

3 impose a penalty
- ☐ yes
- ☐ no

4 assess a personality
- ☐ yes
- ☐ no

5 balance existence
- ☐ yes
- ☐ no

6 approve a recommendation
- ☐ yes
- ☐ no

7 switch channel
- ☐ yes
- ☐ no

8 occupy a territory
- ☐ yes
- ☐ no

PART C

9 bury the universe
- ☐ yes
- ☐ no

0 embrace diversity
- ☐ yes
- ☐ no

1 bury waste
- ☐ yes
- ☐ no

2 doubt the existence
- ☐ yes
- ☐ no

3 adapt a recipe
- ☐ yes
- ☐ no

4 adapt recovery
- ☐ yes
- ☐ no

5 process a request
- ☐ yes
- ☐ no

6 celebrate a phrase
- ☐ yes
- ☐ no

7 negotiate an arrangement
- ☐ yes
- ☐ no

8 practice a craft
- ☐ yes
- ☐ no

9 contact a clock
- ☐ yes
- ☐ no

0 display emotion
- ☐ yes
- ☐ no

1 celebrate a wedding
- ☐ yes
- ☐ no

2 resist infection
- ☐ yes
- ☐ no

3 distribute an objective
- ☐ yes
- ☐ no